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the 1990s, the number of people with a mental health problem has increased by 50% (Mental Health Foundation, 2000).

There is a growing awareness of the need to address the needs of people with mental health problems, and the importance of providing them with appropriate services. This has led to a number of initiatives, including the development of mental health services, the establishment of mental health trusts, and the implementation of mental health legislation. The aim of this paper is to review the current state of mental health services in the UK, and to discuss the challenges facing them in the future.

The paper is organized as follows. First, we discuss the current state of mental health services in the UK. Second, we discuss the challenges facing mental health services in the future. Third, we discuss the role of the mental health professional. Finally, we discuss the role of the patient.

The current state of mental health services in the UK is characterized by a number of challenges. First, there is a shortage of mental health professionals. Second, there is a shortage of mental health services. Third, there is a shortage of mental health funding. Fourth, there is a shortage of mental health research. Fifth, there is a shortage of mental health education.

The challenges facing mental health services in the future are likely to be even more significant. First, the number of people with a mental health problem is expected to increase. Second, the needs of people with a mental health problem are expected to change. Third, the resources available to mental health services are expected to decrease.

The role of the mental health professional is to provide care and support to people with a mental health problem. This involves a number of tasks, including assessing the needs of the patient, developing a care plan, and providing care and support. The role of the patient is to participate in the care and support process, and to work with the mental health professional to achieve their goals.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poincianna, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughe, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.**

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

JANUARY, 1912.

No. 1.

INDEX FOR VOLUME VIII.

With this number is issued the table of contents and index of Volume VIII of The Hawaiian Forester and Agriculturist. We flatter ourselves that the plan adopted is an improvement on the index of Volume VII. The object sought, and we believe gained, was to secure the minimum of effort to find any particular thing wanted in the volume. Minutes of the board and reports of divisions are sub-indexed to show every important topic contained therein. Similarly contributed articles, reports of the conservation meeting and the rubber growers' convention, and even selected articles of varied scope, are sub-indexed. Editorial matter is indexed both as to headed articles and independent paragraphs. Besides the indexing of subjects in board minutes and division reports, incidental references to board or division elsewhere are indicated under the head of government bodies.

As to the subject-matter analyzed in the index, it is evident that the magazine has covered a wider field, the past year, than ever before in its eight years of existence. Besides being a record of the activities of the Board of Agriculture and Forestry, it has been made an organ of the educational department of the Territory, although in a different way. During the year considerable information relating to the College of Hawaii, much of it didactic for the benefit of both teachers and students in all schools, has been given in the pages of the magazine. Most of such matter has borne upon nature study in the public schools and farm and garden science. The proposed course of study for the public schools is elaborated in the latter part of the volume. Another valuable feature of the Forester for 1911, although not so fully developed as the editor desired, is that of the technical articles contributed by specialists, such as Messrs. Hagens and James, which cannot possibly have failed to yield benefit to culturists in our diversified agricultural industries. To supplement such original contributions, the exchanges have been diligently searched for useful information on tropical agriculture.

That the entire bill of fare has been varied is somewhat evidenced by the fact that the volume just closed contains an aver-

age of more than twelve headed articles each number. The great variety of topics treated, one way or another, is shown by the index. A special effort will be made this year, with the kind assistance and counsel of the agricultural and educational chiefs and divisional lieutenants, to make the Forester and Agriculturist worthy of the advancement in both those lines which the Territory is today showing.

THE FRUIT FLY CAMPAIGN.

Nothing could be more reassuring to the general agricultural interests of the Territory than the promptness and energy with which the Board of Agriculture and Forestry has brought into play the powers the legislature of 1911 conferred upon it, both of authority and of finances, to combat the ascendancy of the Mediterranean fruit fly. Already the Forester has congratulated the board upon securing the services of W. M. Giffard, through his acceptance of honorary membership of the entomology committee, as director of the campaign against this destructive pest. That no mistake was made in this appointment has evidence already in the businesslike report, both of plan and progress, which Mr. Giffard has made as appears elsewhere. With the assistance of the California commission of agriculture, backed by a substantial money contribution from that State, there is every reason to hope that the time is not distant when the pest will be well controlled here—just as well as the sugar planters have reduced to a minimum the destructive activity of the cane leafhopper.

The menace of complete destruction by the Mediterranean fruit fly of a large proportion of the Hawaiian fruit industry, just as it seemed to be on the eve of great expansion, will not have been an unmixed ill if it result in the enforcement of clean culture upon horticulturists of all nationalities in these islands. That this happy end will be gained has much promise from the energy with which it is being pursued by Messrs. Ehrhorn, Starrett and Giffard.

Three numbers of rules and regulations lately adopted by the Board of Agriculture, with the Governor's approval, all relating to the suppression of pests, are officially published in this issue. All growers of fruits and vegetables will be wise to heed them.

Anyway, there is little fear that dogs quarantined against rabies will be any the worse for detention the required period. The anxiety of the Territorial veterinarian to preserve the canine realm of Hawaii from such dire infection is an earnest that he will not allow the strangers to be abused in quarantine.. Properly conducted quarantine kennels ought to be a good place for acclimating the alien dog.

SIX-FOOTED PUBLIC QUESTIONS.

Some of the Inter-relations between Insects and the Community.

(An illustrated address delivered before the Public Questions Club of Honolulu, Nov. 7, 1911.)

It is my purpose this evening, in addressing the Public Questions Club, to briefly indicate a few of the innumerable relationships that exist between the social community and that marvelous group of creatures which we know as insects. This may be considered as the introduction to a detailed discussion of our insect problems, which I hope will follow this paper. Some lantern illustrations will aid in elucidating such matters as life-histories, coloration, and structural details.

One need not apologize in presenting insects as a public question. Indeed, they have already intruded themselves as such. The yellow fever mosquito, the Mediterranean fruit fly, and others have been prominent subjects of conversation and comment, over the coffee cups as well as in the office. They have extended their range from the narrow confines of technical treatises and experiment station bulletins, and now array themselves in the conspicuous places of the daily press, and journey by cablegram from Washington and back again.

Insects have always been a public question. Time was, when man lived in a cave, wore a bear-skin, and carried a stone club, that certain insects constituted a very personal and painful question, nearer than clothes, and shed with much more difficulty. Perhaps one of man's first asseverations of his dominion over nature was his freeing of his body from various insect pests. These, having chosen external regions of his person as their habitat, could be easily eradicated by means of personal cleanliness. It is a striking commentary on the progress of the human race as a whole to note that a very large portion of the human race has not yet attained even this low stage of comfortable existence.

As an "aside" it may be said that civilized man himself is just upon the threshold of realization of the enormous battle ahead if he would wholly free himself of the devastating ravages of those microscopic plants called bacteria, which may frequent all parts of his natural anatomy.

To return to insects, we are now entering the era of social consciousness wherein it is realized that insects are no longer personal problems. They can be fought successfully only through commercial method. The boy with pediculosis (which is merely the polite scientific way of saying fleas), has no right to infect a school room; the dairyman and the butcher dare not permit the filthy house-fly, which is engendered in dung, and which carries typhoid, to pollute their wares; Mr. Blank is not acting fairly

when the undrained pools upon his land breed mosquitoes that range the neighborhood.

An insect whose life-cycle excellently illustrates this necessity for community labor is the peach-tree borer. The adult of this pest is a pretty little moth, the females having bluish wings and an orange band on the abdomen, the males having clear wings and no orange band. The eggs are laid on the bark of peach trees, near the ground. When highly magnified they show beautiful reticulate markings, as do the eggs of many insects. The larvae or "grubs" bore into the bark, and throughout the wood, forming long winding tunnels, and greatly injuring or killing the tree. When mature the grub forms a cocoon near the surface of the ground, and changes into the pupa from which the adult emerges. Trees infested by these borers can be recognized by the large masses of gummy exudation around the base of the tree.

There are various devices for protecting the trees from the attacks of this pest. Coverings of tarred paper, wire and wood-veneer have been tried with varying success, the idea being to prevent the female from laying eggs on the tree. In an experimental orchard it was found that deterrent sprays sometimes kill the trees.

Fighting the peach-tree borer means, then, that all persons owning peach trees must enter into the campaign. Otherwise a single unguarded tree may supply a large region.

The cabbage-worms also illustrate the need for "team work." The white butterflies are well known to every countryman. The eggs are laid on the cabbage leaves. These are delicately sculptured. The larvae devote their entire time and energy to the devouring of cabbage foliage, and if they are numerous the cabbage naturally succumbs. Fortunately the caterpillars are subject to the attacks of a fatal bacterial disease, which aids in holding them in check. They have also a number of parasitic enemies, who decimate their ranks. When mature the caterpillar suspends itself by means of a silken button and girdle and transforms to a protectively colored and quiescent chrysalis, from which emerges the adult. To eradicate the cabbage-worms of a given region obviously demands the coöperation of all the cabbage growers of that region, else a single untended patch will become the breeding grounds for the whole region.

Man is aided in his combat against destructive insects by the fact that many insects are predaceous, feeding upon other insects. Dragon flies, which feed upon mosquitoes, and mud-wasps, which fill their nests with spiders, are well known examples of this class. Perhaps one of the most remarkable of these predaceous insects is the praying mantis. This strange creature is so-called because of its hypocritical attitude of pious harmlessness, the highly specialized front legs being, in reality, powerful grasping organs, wherewith the wolf in sheep's clothing seizes its helpless prey. The eggs are laid in curious masses, whose tops have the appear-

ance of being braided. The young hatch almost simultaneously from the egg-mass, and crawl away, leaving behind their cast-off nymphal skins.

Other insects render service to man by destroying weeds and other noxious plants, the milkweed caterpillar being one of this sort. The adult is a brown butterfly common in many meadowlands. The caterpillar is distinguished by its bold black, white and yellow bands. When full grown the caterpillar suspends itself by means of a button of silk and transforms to the chrysalis from which in due season the adult butterfly emerges. It is interesting to note that the milkweed butterfly has a flavor noxious to birds, and is therefore not devoured by them. Another butterfly of an entirely different family, and lacking any noxious protective flavor, has assumed the protective coloration of the milkweed butterfly. It is a neat instance of mimicry.

A fourth group of insects are those whose larvae feed upon plants that are not of economic importance. The Cecropia moth, found throughout the United States mainland, is of this class. The eggs are deposited upon the leaves of various forest trees. The caterpillars are rarely injuriously abundant. They are remarkable for their defensive armor of bristle-covered tubercles, which persist in all the varied molts through which they pass. Before the final molt a cocoon is spun, and within the finished cocoon the pupal stage is assumed. The Cecropia pupa is so large that the various parts of the adult which is to come from it can be readily distinguished.

This silk-producing habit of caterpillars is commercially utilized, as is well known, in the case of the silk-worm. The moths of this species are reared in captivity, and the eggs are given great care and are artificially incubated. The young silk-worms are fed and tended by experts. When they attain full size they spin the familiar cocoon of commerce. The cocoon contains, of course, the pupa, which is killed by immersion in hot water. This process also loosens the thread, which is then reeled. The adults are permitted to emerge from certain cocoons and are kept for egg-laying.

The Caveman freed himself from vermin with greater ease than he did his lair. The lair problem is one that exists into this day. The festive roach is a question that we would not make public. There are a large number of species of roaches, varying greatly in appearance, but if you hit any one of them too hard with a newspaper it will leave a spot on the wall-paper!

A still more delicate problem is that of the ancient disturber of Morpheus, the bed-bug. When magnification reveals his corpulence and armor, our animosity suffers no decrease, but rather increases proportionally. The various pests that attack foodstuffs gain nothing in attractiveness by magnification, although this process reveals how admirably they are fitted to carry on their destructive work. The termites or "borers" that riddle our wood-

work, especially koa and similar hard-grained and non-resinous woods, are household problems that can best be fought along household lines.

It is pleasant to turn from the consideration of these small, destructive, inartistic vermin to the large and beautifully colored representatives of the six-footed folk. These are the winged jewels of the insect world. The variety of color-patterns and color-tones is well-nigh infinite. These frail creatures of the air are not to be considered as public questions in any inimical sense, but as public property. They deserve our attention because of their intrinsic loveliness, knowledge of the fascinating cycles of their lives and of their place in the great world of Nature should be the common property of every school-child.

VAUGHAN MACCAUGHEY.

The College of Hawaii.

CLEAN CULTURE.

This was the topic for discussion at the first meeting, November 9, of the season of the Agricultural Seminar. A lucid and succinct presentation of the subject was made by Supt. E. M. Ehrhorn, which is printed in full elsewhere.

This paper was followed by general discussion, of special note being the remarks by Mr. Giffard regarding the relation of clean culture to the control of the Mediterranean fruit fly. Dr. Wilcox discussed the striking relationships between clean culture and the control of the cotton boll worm. Notice was also called to clean culture as a part of the present mosquito campaign. The value and importance of clean culture methods, as supplementing such methods as parasites and sprays in the control of insects, was commented upon.

The meeting was held at the College of Hawaii, and was well attended. It should be stated that these meetings are open to all men who are interested in agriculture or related sciences.

VAUGHAN MACCAUGHEY, Secretary.

Supervisor Low has from his official seat expressed the opinion that there is no menace of rabbits, his reason being that the animal thrived greatly at Niu many years ago but never spread from that spot. Perhaps they never emerged from the little oasis in a wilderness of rocks and wilted scrub because it was impossible for them to eat their way out to cultivated areas through miles of such existing barriers. Even more certain would be the impossibility of fighting their way out, considering the gauntlet of fierce dogs and mongoose Bunny would have to run. There are enough vagrant dogs around the strategic point of the Kaimuki car terminus to chew up the entire rabbit pest of California were it transplanted thither.

CLEAN CULTURAL PRACTICE METHOD FOR FIGHTING INSECT PESTS.

BY EDW. M. EHRIORN.

In the course of the ages through which our world has existed, there has been gradually established, by the influence of surroundings, a certain ratio between animals and plants. There is a continuous struggle going on among the plants themselves as well as a struggle between the plants and insects. This has been more generally observed where nature's influence has been upset, making surroundings as it were unnatural. Extensive plantings of one plant or other has created abundance of food which very soon is eagerly sought by various enemies, either fungi or insects, and nature is unable under such conditions to hold her balance.

From the time that man began to cultivate, his crops have been attacked by some pests, be it vegetable (fungi) or animal (insect pest) and we find in some of the oldest books on gardening and entomology how the early farmer and horticulturist had certain remedies to combat the enemies of his crops with. Many of these were rather queer in their composition. I remember reading of a remedy which was used in the Southern States consisting of lime, soap and whisky.

Within the last decade great strides have been made in fighting pests but it is not my intention today to dwell on insecticides and their uses, nor on parasites and predaceous enemies of our pests, nor on the great benefits which have been derived from such methods. I am going to draw attention to a method which I am sorry to say is but little known in these Islands and which, if taken up by the various growers, will do much to check the ravages now caused by various pests. I draw your attention to the practice of clean culture. Cleanliness on a farm, in a field or in a garden means much to the crops or to plants and much toward the reduction of pests. Why? Clean culture means cleanliness; the destruction of weeds, the removal of crop remnants as soon as the crop is done; picking up and destroying dropped fruit, removing, burning up, or otherwise destroying all rubbish that cumbers the ground. Experience has shown that many of our pests are protected by these very materials which we should get rid of.

Take our melon fly as an example. This pest has been in the Islands over twenty years and it is today one of the worst pests we have. It is next to impossible to raise cucumbers, melons or squash and only by covering over these is the grower rewarded by being able to raise a few inferior melons. Why is this so? Anybody can go into the outskirts of Honolulu and he will sometimes see fields of cucumbers, melons and the like lying about the ground and if he should take the time and examine a few he would find them decayed and alive with maggots, a large per cent. being those of the melon fly. What if clean cultural practice were em-

ployed, the gathering up and destroying of all such rotten, infested produce? Sometime ago I cut a small piece of a water melon from one found in a field and placed it in one of my breeding jars. From that piece, about 3 inches square, I bred 109 melon flies, not counting a large number of decay flies which also issued from it. I have often wondered how many flies could have been bred from the melon and how many flies would have bred from the field on which were many hundreds of melons. Would clean cultural practice pay in a case like this one? It surely would, and on account of the habits of the insect, clean cultural practice would be the only profitable way of coping with the pest. I mentioned the destruction of weeds as pertaining to clean cultural methods. Many fields after being planted to various vegetables are allowed to grow up in weeds and the crops usually are of inferior quality. Not only that but certain pests are attracted to the weeds and also find good food on the growing crop. After the crop is harvested the rubbish and weeds are usually allowed to remain for some time and many insects collect and hibernate in the tangled mass, patiently waiting for the next planting to be made. Now that the Mediterranean fruit fly is with us we can readily see that the practice of clean culture, the collecting and destroying of all infested fruit will do much toward checking this pest. In fact I have already met several who have started this method and they have reported improvement in their crop conditions.

In a vegetable garden not long ago I saw a lot of old cabbage plants, the remnants of the crop. The heads had been cut out and the stump left and new growth had started and these plants were completely covered with the cabbage aphid and nearby the ground had been prepared for another cabbage crop. Now if the plants had been pulled up and destroyed, the breeding place for the aphid would not exist, and the newly planted crop would be, practically speaking, free from the pest.

We very often see a grower plant a piece of land which was covered with healthy weeds and at once start to plant all kinds of small crops in the field. The seeds sprout and suddenly disappear and Mr. Grower can't understand what is killing the plants. He calls in the Bugman, who shows him some fine fat cutworms. Nature had provided a feast of weeds for this pest, but Mr. Grower destroyed the food and planted new food. Had he any knowledge of clean culture methods he would not have allowed these weeds to grow long enough to attract the cutworm; also, he should have plowed the weeds under several weeks before planting his crop, so as to starve the cutworms or prevent their development.

No matter where we go or where we look we find some cause for all the trouble with our fruits, plants or vegetables. The other day a shipper received word from the Coast that his bananas had to be fumigated on account of scale insects. He said: "Just think of it, bananas infested with scale, never heard of such a thing before, thought that only trees could be infested with scale."

Well, he wanted me to go and take a look at the plantation. I told him that I knew of three species of scale insects infesting the banana plant and fruit and that we would probably find the plantation badly infested, if the scale had been found plentiful on the fruit. Just as I had expected, the plants, in fact the whole grove, was in a terrible condition. Old stumps had been left standing, the dry leaves were hanging over the old and new growth and were all badly infested with scale insects, which, as the leaves dried up, readily crawled to the new leaves and to the forming bunches. The existing condition was absolutely unnecessary and the chances of re-establishing a clean plantation by the application of clean cultural methods should be a very easy task, but it must be done on a thoroughly systematized plan.

To illustrate how important clean cultural methods are, I may mention that the cotton growers, who, under ordinary conditions lose from 50% to 75% of the cotton crop, owing to the serious attack of the cotton boll worm (*Celechia gossypiella*), can and have proved, that by collecting the affected bolls, or on a larger scale, by pruning the cotton plants, removing all infested bolls and the late stragglers which generally harbor the cotton worm, the pest can be reduced to a very small percentage.

Clean cultural methods, when carried out in conjunction with spraying or if carried on where the natural enemies of the various pests abound, always show a decided improvement owing to the action of two or three factors working together, but clean cultural methods alone will do much toward a very good check on some of our worst pests. The old saying, "An ounce of prevention is worth a pound of cure," is as applicable to man in relation to insects or fungi which injure his crops as to other matters which affect his well being. The enterprising grower who employs practical methods for the control of insect-pests which menace his crops has a distinct advantage over one who does not. He is enabled to obtain a good yield while the careless grower only gets loss and disappointment. Eternal vigilance is the price of a good crop, especially in a country where the summer season always prevails.

Coöperation in the control of pests is another feature of success and should be instituted on business lines. The greatest damage to a thrifty farmer or grower is very often caused by his negligent and indifferent neighbor. It does not seem just to the clean culture grower that his next door neighbor should be allowed to breed all kinds of pests which soon find their way to his clean farm, and it is not just and should be remedied. The careless banana grower should not be allowed to produce scale infested fruit which when sent to the outside market is held up, fumigated and condemned, and will, if such infested fruit is permitted to be shipped, probably stop a good and paying industry. Steps should be taken to protect the industrious, clean culture practicing grower by regulations which can be used to make those who do not protect their own crops abate their nuisance and thereby check the promiscuous breeding of all kinds of pests.

THE "AIR-PLANT," BRYOPHYLLUM.

AN INTERESTING PLANT OF HAWAII.

VAUGHAN MACCAUGHEY, *The College of Hawaii.*

Hawaii can boast of many unique plants. There is perhaps no region of similar area in the world whose flora is so rich in peculiar forms. The "air-plant" or Bryophyllum, well-known to many people, but unknown to a still greater number, is a plant, found in these islands, that has many curious and remarkable points of interest.

The plants of the Hawaiian Islands may be grouped in two great classes,—first, those that are native or endemic to these islands; and second, those that have been introduced through human agencies. To the first class belong such plants as the koa, kauila, maile, bird's-nest fern, etc.; to the latter, such forms as the taro, breadfruit, banana, sweet potato, and a host of other useful and ornamental plants.

The air-plant belongs to this latter group. It is of comparatively recent introduction, but has been carried to several of the islands. In Hawaii it is common in portions of the Kau lava flows, and along the Kona road. On Oahu it occurs in abundance along the roadsides near the Nuuanu Pali. It forms a conspicuous part of the undergrowth in the eucalyptus forest on Tantalus, and is found in various waste-places in the vicinity of Honolulu (Fig. 1). It doubtless occurs on the other large islands of the group.

The special claim of the air-plant to our interest is its peculiar ability to form new plants along the margins of its leaves (Fig. 2). The leaves are arranged oppositely upon the stem, and thus appear to be in pairs (Figs. 1, 4). This is a marked contrast to the leaf-arrangement of such a plant as hala or papaia, whose leaves are arranged in spirals or whorls; or that of such plants as sugar cane or bamboo, whose leaves are arranged alternately, each leaf being half-way around the stem from the one immediately adjacent to it.

The leaf itself is either simple in outline, or is sometimes divided into several (usually three) large leaflets, the terminal one being larger than the others. The leaf is oval in shape, and thick and fleshy in texture (Figs. 3, 4). Due to the succulency of the leaf its veins are indistinct, being more or less imbedded in the fleshy tissues of the blade. A short, fleshy petiole attaches the leaf-blade to the stem.

The margin of the leaf is scalloped or crenate, and it is from these notches or serrations that the little plants develop. In each notch on the margin of a mature leaf there is a group of

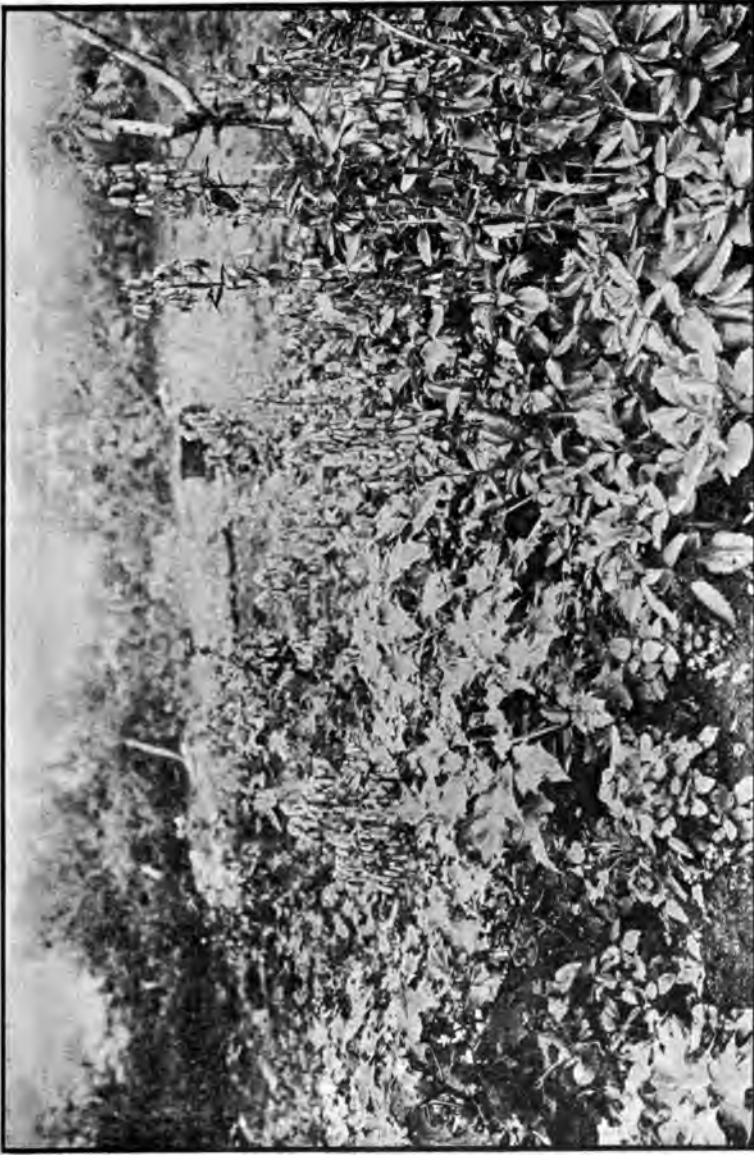


FIG. 1.

(lump of Bryophyllum plants. Note the characteristic foliage, and flowering stems. The plants towards the left side of the picture are "Jimson Weeds" (*Datura*).



FIG. 2.

Leaf of Bryophyllum.

This leaf had been pinned to the wall. Note the little plants that developed in the notches of the leaf.

cells, which constitute embryonic tissues. These cell-groups can be seen, as small dark dots, with the unaided eye, and are rendered quite distinct by the use of a simple lens. So long as the leaf remains upon the stem, there is usually no further development of these cell-groups. If, however, the leaf be plucked off, or drops of its own accord to the ground, an active process of cell-growth and multiplication takes place in these embryonic tissues, resulting in the formation of little plants, with stems, leaves and roots (Figs. 2, 3).

The mature leaves of the air-plant are so thick and fleshy, and contain such an abundance of reserve material and water that it is not necessary for the leaf to obtain any nutriment from outside sources, in the formation of these new plants. For this reason a leaf may be pinned up on the wall (Fig. 2), and this remarkable reproduction will take place, the parent leaf sustaining the little one for some time until they die. Under natural conditions the leaves drop down onto the ground and the young plants quickly strike root (Fig. 3).



FIG. 3.

Leaf of *Bryophyllum*.

Showing the development of little plants from the leaf under natural conditions, the leaf having dropped into the soil. (From Bailey—Cycl. Amer. Hort.).

This remarkable ability of the leaves to produce new plants without being planted in the soil, (as is necessary in the case of begonia leaves, which will also produce new plants, though in a somewhat different manner), has given to the plant the name of "air-plant." Its botanic name is *Bryophyllum*, which is derived from two Greek words meaning "sprouting leaf." The species occurring in the Hawaiian Islands is *Bryophyllum calycinum*, originally a native of Africa, but now distributed throughout the tropical world. This species is also known, in botanical books, as *Kalanchoe pinnata*, and *Cotyledon rhizophylla*. There are three other kinds of *Bryophyllum*, one occurring only in the Cape region of Africa, and two confined to Madagascar. The great German poet-philosopher-naturalist Goethe was much in-

terested in *Bryophyllum*, and mentions it repeatedly in his writings.

Another curious fact concerning the leaves of *Bryophyllum* is that they "are sour in the morning, tasteless at noon, and somewhat bitter towards evening. This change has been attributed to the absorption of oxygen at night and its disengagement in daylight."—W. Miller. In India the leaves are used by the natives for various medicinal purposes. They are slightly toasted and applied to wounds, bruises, boils, and the bites of venomous insects. They are also applied as a poultice to contused wounds, this treatment preventing the swelling and discoloration, and aiding the cut parts to unite rapidly.

The air-plant is a tall erect herb. The stem often branches at the base and is more or less shrubby (Fig. 1). It is reddish in color, with raised, oblong, whitish spots. Although soft and herbaceous in texture, the air-plant is perennial, its life extending throughout an indefinite number of seasons.

One of the striking characteristics of the air-plant is the succulency of its tissues. Certain plants store up in their tissues large quantities of woody matter, and these woody plants are termed trees or shrubs. The great majority of plants do not develop woody tissue in appreciable quantities. This type comprises all of the ordinary herbaceous vegetation. A third type of plant body is the succulent type, characterized by fleshy tissues and large amounts of stored water. These plants are usually adapted for existence in dry or arid regions, indeed, this enormous water-storage power is one of their adaptations to resist drought. To this class belong such plants as the air-plant, sisal, and the various forms of cactus.

Another drought-resistant adaptation of these plants is the nature of their skin, or epidermis. It is easy to understand that either a woolly or hairy covering, (the denser the better), or a layer of wax would be efficacious in preventing the undue evaporation of water from the plant's tissues. Such plants as the air-plant, sisal, and cactus have remarkably smooth waxy skins. (Fig. 4.)

The *Bryophyllum* flowers are in large, spreading clusters, the branches of the cluster being arranged oppositely, in pairs. The flowering stem is erect, and cylindrical in cross-section, (the leafy stems are frequently angular), and is spotted with dark purple.

The flowers themselves are 1½-2 inches long. They are pendulous or inverted in position, and sway gently in the breeze like fairy bells. The outer layer or calyx is greenish in color, striped with purple at the base. In shape the calyx is like an inflated cylindric bag, 1-1½ inches long, and divided at the open end into four lobes (Fig. 5). Projecting beyond the calyx lobes of a mature flower are the bright reddish-purple lobes of the corolla, which form a cylindric bag within the calyx. The



FIG. 4.

Flowers and Leaves of *Bryophyllum*.

Note the fleshy nature of the leaves, and the pendulous arrangement of the flowers.

corolla lobes are sharply pointed, and spread outward. That portion of the corolla which is hidden within the calyx is green in color.

Within the corolla are four pistils, (the seed-producing organs), and eight stamens, (the pollen-producing organs). The pistils are either entirely separate from one another, or are somewhat joined together at their bases. Each pistil consists of three parts,—1, a basal enlarged portion, the ovary, which contains the numerous ovules or unfertilized seeds; 2, a long slender portion, the style, which connects the ovary with (3), the stigma, which is borne on the end of the style, and which is more or less hairy, to receive the pollen. The pollen grain falls upon the stigma, grows down through the hollow style, and fertilizes an ovule in the ovary.

The eight stamens, in two rows of four each, are fastened on the inside of the middle portion of the corolla, and are just long enough to protrude slightly beyond the corolla. Each



FIG. 5.

Flower of *Bryophyllum*.

Showing a bud, an opened flower, and a withered flower.

(From Bailey—Cycl. Amer. Hort.)

pistil develops into a slender pod, that splits open along one side to permit the escape of the many seeds within.

Because of its simple and plentiful mode of vegetative reproduction, the air-plant is easy to propagate and raise. It will grow on almost any soil, and requires practically no attention. It is especially useful for bedding effects among rockery or around the foundations of houses. Although it will grow in comparatively heavy shade, it thrives best in a sunny locality. When once started the plant will propagate itself by means of its fallen leaves, thus constantly increasing the area covered. Its large size and habit of spreading render it unsuitable for planting in pots or boxes.

Its sturdy character and rapid growth should commend the air-plant for more general use as an ornamental plant, and its curious habits should attract those who are interested in the plant-life of Hawaii.

NOTES ON SOME HONOLULU PALMS. I.

VAUGHAN MACCAUGHEY, *The College of Hawaii.*

THE CANE PALMS—BACULARIA.

This group of palms is so called because of the resemblance of their stems to canes or walking-sticks; these latter being some-



The Cane Palm.

times manufactured from the slender and symmetrically marked trunks. The Latin word baculum means a small walking-stick. These palms are indigenous to temperate and tropical Australia.

The trunk is either single, or there may be a number of stems growing closely together (fasciculate), resembling the mode of growth of the algaroba tree when it grows in dense thickets. This fasciculate growth may be also compared to the clump habit of the bamboos, and of certain wine palms. The segments of the leaves are membranous in texture, and are split or toothed at their apices; the broader segments have many veins, the narrower ones have but a single vein; the segments at the free end of the leaf are confluent or apparently fused together. The margins of the leaf-segments are not especially thickened; at the base of the segment these margins are recurved. The petiole and midrib of the leaf is covered with a sparse scurfy layer; on the under side they are convex in cross-section, on the upper side, flat, or concave near the base of the leaf.

The flowers are greenish; the fruit is small, being but $\frac{1}{4}$ - $\frac{1}{2}$ inch in length, is elongate-ovoid in shape, and is greenish in color. The above characteristics apply to all the cane palms. There are several species (for original descriptions see F. Mueller, *Fragm. Phyt. Austral.*, Vol. VII, page 103), the one occurring in Honolulu being, in all probability, *Bacularia monostachya*.

This palm is planted as an ornamental in a number of Honolulu yards. The accompanying illustration is of a thriving plant in a yard on Emma street, opposite Emma Square. This species has a trunk 6-12 feet high, and leaves $1\frac{1}{2}$ -4 feet long. The sheath that occurs at the base of each leaf is broad, leathery in texture, and about six inches long. The leaf-segments are very irregular in shape and in distance apart. Their tips are sharp pointed; their bases are either fastened directly to the midrib of the leaf, or are somewhat tapering; the longest segments are about one foot long.

The fruit of this species is ovoid or sometimes nearly globular in shape; is about one-half inch long; and consists of a hard seed covered by a rather thin, succulent outer layer.

The foliage of the cane palms is of a very attractive shade of green, and is graceful in outline. The seeds germinate fairly well if planted in pots or flats on raised benches, and the young seedlings have no special pests or difficulties. There is no reason why these small and beautiful palms should not be more widely planted and better known. Because of their small size they will fit into many parts of a planting scheme where larger palms could not be used, as is illustrated by the specimen figured. It is growing close to and screening a lanai otherwise open to the street. The cane palms deserve better acquaintance.

A SHORT COURSE FOR TEACHERS.

The College of Hawaii offers a course of fifteen lectures for the benefit of teachers and others interested in the elementary schools.

These lectures deal with the various phases of the elementary school curriculum. The selection of subject-matter, the use of experiments and illustrative material, and similar practical topics, will receive special attention.

This course is open to teachers and the public free of charge. Persons desiring a certificate will register, will attend regularly, and will submit a note-book at the close of the course. The certificate states attendance and grade, and is sanctioned by the Department of Public Instruction.

The lectures are given at the College, on Mondays, 3 to 4 p. m., as follows:

1. Jan. 8—The Outlook for the Schools... President Gilmore
2. Jan. 15—The English Language and the Schools....
..... Dr. Andrews
3. Jan. 22—The School Library..... Miss Green
4. Jan. 29—School Architecture..... Prof. Young
5. Feb. 5—The Sanitation Problem and the Schools....
..... Prof. Keller
6. Feb. 12—Elementary Experiments in Physics.. Prof. Ballou
7. Feb. 19—Simple Experiments in Chemistry.....
..... Prof. Dillingham
8. Feb. 26—Agriculture in the Public Schools... Prof. Krauss
9. Mch. 4—Domestic Science in the Schools..... Miss Lee
10. Mch. 11—The Study of the Sea..... Prof. Bryan
11. Mch. 18—Methods in Insect Study..... Dr. Severin
12. Mch. 25—The Plants of Hawaii..... Mr. Rock
13. Apr. 1—Material for History Lessons..... Miss Yoder
14. Apr. 22—The Pedagogy of Arithmetic... Prof. Donaghho
15. Apr. 29—Art Appreciation and the Schools.. Miss Chipman

For any further information regarding this course, address

VAUGHAN MACCAUGHEY.

Phone 2040.

CHAMBER OF COMMERCE PEACE ESSAY PRIZE.

The attention of all students over fifteen years of age in all schools, both public and private, in the Territory of Hawaii, is called to a prize of \$50.00 offered by the Peace Committee of the Honolulu Chamber of Commerce to the best essay upon the subject of International Peace, all as per terms named below:

1. Subject: "International Peace."
2. Length: Not to exceed 2000 words.

3. Signatures: Essay to be signed with an assumed name, the real name to be in an enclosed envelope, duly sealed, said envelope to be labelled with the assumed name and not to be opened until the judges of essays have rendered their decision to the Peace Committee.

4. Time Limit of Submission: All essays to be sent, or handed in to the Peace Committee of Chamber of Commerce, on or before May 15, 1912.

5. Decision: Decision to be announced on Friday, May 31, 1912.

6. Judges: Judge William L. Whitney, Rev. William B. Oleson, Mrs. D. L. Withington.

7. Prize: Fifty dollars (\$50.00).

8. Open to Whom: All scholars over fifteen years of age in all schools, both public and private, in the Territory of Hawaii, are offered this opportunity to compete.

9. One Special Condition: Also in the sealed envelope shall be enclosed a statement signed by the writer of essay that outside assistance in its preparation has not been received.

This proposition is issued by

WILLIAM A. BOWEN, Chairman,
ROBERT F. LANGE,
GILBERT J. WALLER,

Honolulu Chamber of Commerce Peace Committee.

Issued Honolulu, January 18, 1912.

A LIST OF BULLETINS RELATING TO ELEMENTARY AGRICULTURE.

Compiled for the use of the elementary schools of the Territory of Hawaii.

Any of the bulletins in this list may be secured free of expense by writing to the department mentioned. In asking for any of these publications, the full title as given below must be plainly stated.

Agriculture in General—

1. Agriculture in Hawaii (H. P. C.).
2. Hawaii, Its Agricultural Possibilities (H. P. C.).
3. Country Life Education (U. S. D. A.).
4. The Teaching of Agriculture in the Rural Common Schools (U. S. D. A.).

BOARD OF AGRICULTURE AND FORESTRY.

Owing to circumstances outside of the control of the editor, no report of the meetings of the Board of Commissioners of Agriculture and Forestry, since that of the meeting of October 5 last, has been published in the Forester. Below are presented summaries of meetings since that date, condensation being exercised more liberally upon the earlier than the later minutes.

Meeting of October 5.

C. S. Judd, president and executive officer; J. M. Dowsett and H. M. von Holt, members; E. M. Ehrhorn, R. S. Hosmer and Dr. Victor A. Norgaard, heads of the divisions of entomology, forestry and animal industry, respectively; present.

Dr. Norgaard brought up the matter of an automobile for his division, which was deferred. He also obtained an excuse from the meeting to return to the Cavalry post at Leilehua, where a case of glanders had been discovered.

Mr. von Holt brought up the matter of damage to the Makiki garden caused by public works blasting, and it was voted to write to the Superintendent of Public Works and ask for precautions in the future.

Mr. Hosmer presented a special report on rabbits and it was decided to ask the coöperation of the Hawaiian Sugar Planters' Association in such action as might be desirable.

Mr. Ehrhorn made a statement of his observations in San Francisco of fruit shipments from the islands. Pineapples from the Clark Farm Co. packed in excelsior arrived in perfect condition, but some Wahiawa pineapples were soft and squashy. F. L. Waldron, through whom the latter were shipped, explained that rain had fallen on the pack, causing the fruit to heat. It was voted to write to fruit exporters and inform them of the liability of having their shipments condemned in San Francisco if received in poor condition.

Dr. E. R. Glaisyer resigned the position of assistant veterinarian on the island of Hawaii. It was voted to notify Theo. H. Davies & Co. that the veterinarian had resigned owing to insufficient support, and that future quarantine on Hawaii would have to be conducted by an inspector specially sent from Honolulu at the expense of the plantation receiving a shipment of animals.

An amendment to the rule allowing the shipment of taro from Honolulu to Hilo was adopted and ordered published.

Mr. Ehrhorn reported he had received a request from Superintendent John McLaren of Golden Gate Park, San Francisco, for some female deer of the Hawaiian variety in exchange for some elk. It was voted that the deer be presented to Golden Gate Park but no elk should be accepted, as they would prove a menace here.

Special Meeting of October 14.

C. S. Judd, president, and J. M. Dowsett and H. M. von Holt, members, were present.

Mr. Dowsett presented a resolution in regard to the Mediterranean fruit fly situation, which was unanimously adopted. Its preamble stated the danger of having Hawaiian fruit importation prohibited in California, and the need of greater efforts to control the invasion of the fly. It was resolved that W. M. Giffard of Honolulu be appointed an honorary member of the committee on entomology, with power to inaugurate and undertake a campaign of systematic clean culture to reduce the attack of the Mediterranean fruit fly, he to recommend for appointment the necessary number of inspectors to carry on the campaign and enforce such rules and regulations as might from time to time be adopted, he also to employ the services of an experienced economic entomologist or entomologists to search for natural enemies or effective parasites to combat the Mediterranean fruit fly.

It was further resolved to forward a copy of the above-mentioned resolution by the first outgoing mail to the California State Commissioners of Horticulture, notifying them that \$8750 had been provided by the government of Hawaii toward the expenses of this campaign, in expectation that the California commissioners would arrange for a like amount, making a total of \$17,500, the amount estimated as sufficient to carry on the campaign until more funds could be provided by next Legislature of Hawaii.

It was voted to publish a notice, in form submitted, to shippers of pineapples and bananas informing them that the California State Commission of Horticulture had notified this board that after October 31, 1911, and until further notice shipments of fresh pineapples and bananas packed in Hilo grass and banana leaves would be refused entry into California, but that pineapples and bananas packed in excelsior, rice straw, paper, crates or sacks would be accepted for the present.

Special Meeting of November 7.

Present, Messrs. Judd, Dowsett and von Holt.

Rule X, concerning horticultural sanitation in and about the city of Honolulu, was adopted and ordered sent to the Governor for approval. (This rule is published by authority in the present issue of the Forester.)

Special Meeting of November 2.

Charles S. Judd, president, and J. M. Dowsett and H. M. von Holt, members, constituted the board, others present being R. S. Hosmer, E. M. Ehrhorn and Dr. V. A. Norgaard, heads of divisions; S. T. Starrett, Territorial marketing superintendent;

C. E. Wright and Dr. H. B. Elliot of Hilo, and D. L. Conkling, Treasurer of Hawaii.

A report of Dr. Norgaard, dated October 9, was read by title and filed, and the president was authorized to write a letter, relative to a suggestion therein, to Dr. George S. Baker, veterinarian, of San Francisco.

It was voted to advertise for bids to furnish an automobile to the division of animal industry.

Mr. Dowsett mentioned a complaint by G. E. Schuman about the charge of 25 cents a head a day on non-quarantinable animals left at the quarantine station. Mr. Schuman expected forty-five mules to arrive that day from Seattle and, although they were not subject to quarantine, he wanted to keep them at the station for an unstated time, but thought \$11.25 a day for forty-five mules an exorbitant charge.

After a discussion—in which it came out that there was a station bill of \$80 against Mr. Schuman remaining unpaid although frequently demanded; also that much damage had been caused to posts and fences by animals kept at the station, to repair which the fees collected could not be applied but had to go into the Territorial treasury as realizations, and that the charge had originally been fixed for the sole purpose of discouraging the practice of keeping animals at the station beyond the three or four days that might be desirable for surveillance—the matter was referred to the animal industry committee with power to act.

Later, Dr. Norgaard having come in and brought up the same matter, the committee made its recommendations, which were forthwith adopted, to the effect that the use of the station be refused to Mr. Schuman until he settles back accounts, that the charge be left as it is, that the time for keeping non-quarantinable animals be limited to ten days, that notices accordingly be posted up in the station and that the executive officer take up with the Attorney-General the matters of lien upon animals and of the disposal of moneys collected.

Mr. Judd made a statement in regard to Rule IX, allowing the shipment of taro to Hilo for poi manufacturing. At Hilo the shipments could be followed up by the inspector, Brother Matthias Newell, and see that they were used only for making into poi. There were now various applications for permission to ship taro to all of the other islands.

Mr. Conkling spoke in behalf of a hui that he represented, assuring the board that none of the taro would be planted and that he was willing to have all shipments inspected.

The matter was referred to the committee on entomology with instructions to allow taro to be shipped to all points, with all due consideration to the condition of the taro when shipped.

Mr. Ehrhorn submitted the question of shipping the lotus root, both to inter-island points and the mainland, it being a customary foodstuff with the Chinese and Japanese in the same degree as

taro was with the Hawaiians. If perfectly clean it could be shipped without danger. Rule IX was devised to give the board control of all shipments. It was decided to refer the matter to the committee on entomology, to take such action as it saw fit, also to take up with the president the revision of Rule IX to cover every contingency.

Mr. Judd called attention to the fact that banana shipments to California were subject to certain inspection conditions for scale and stated that Mr. Starrett desired authority from the board to compel banana growers to keep their fields clean.

Mr. Starrett said banana shipments were being fumigated on account of mealy bug and rose scale. It seemed impossible to get the growers to clean their fields, but he would be glad to assume the work in the interest of clean culture.

Mr. Ehrhorn thought six months would be enough in which to accomplish the work, and recommended that Mr. Starrett be given the authority desired.

It was voted that the matter be referred to the committee on entomology which should make a full report back to the board.

There was a discussion on the Mediterranean fruit fly based on a letter the president had received from Commissioner Jeffrey of California, it being stated that since the letter had been written Mr. Jeffrey had retired and Mr. Cook been appointed in his place.

Mr. Dowsett, commenting on the California official changes, suggested that Mr. Giffard should go to California and personally consult with the authorities. No action was taken.

Mr. Judd reported the Mediterranean fruit fly regulations in the hands of the Attorney General. He also appointed Mr. Dowsett on the entomology committee during the absence of Mr. Waterhouse.

Dr. Norgaard reported progress in the Hilo animal quarantine station, everything being now ready for the board's approval. Mr. Wright believed it would cost \$1000 to move the stalls of the Volcano Stables Co. from the ground to be used. The matter was referred to the committee on animal industry with power to act.

Meeting of November 13.

Present: Chas. S. Judd, president and executive officer; Paul R. Isenberg, J. M. Dowsett, H. M. von Holt, members; R. S. Hosmer, V. A. Norgaard, E. M. Ehrhorn and W. M. Giffard.

Mr. Judd presented and read Rule X. Amendments were suggested and carried to cover throwing discarded fruit on the sea beach and to insert certain words, after which Rule X with the proposed amendments was unanimously approved subject to the Governor's approval.

Reports of the Division of Forestry were received, including one by Mr. Hosmer on awa matters.

In general discussion it was stated that there is very little awa growing on government land under the control of this department, and where it did exist it was almost inaccessible, it having been purposely planted at the tops of mountain ridges and places difficult of access by cattle; that there was always danger of fire started by campers and probably more harm than good would result from allowing it to be gathered, and it was doubtful whether the income to be derived would equal the possible losses. It was also stated that trespass is constantly going on and impossible to prevent. It was suggested that the Nahiku Rubber Co. was probably gathering more awa than anyone else and was the most reliable party interested and could probably give more definite information as to its value and the most feasible manner of handling.

It was unanimously voted that the executive officer be instructed to take the matter up with the Nahiku Rubber Co. so as to ascertain the most feasible way of handling the matter; that no awa licenses be granted at this meeting, but that the matter of future action be left entirely in the hands of the executive officer with full power to act as he sees fit.

W. M. Giffard, director of fruit fly control, read his report and requested suggestions.

The report was accepted and the appointments of the inspectors mentioned in the report were confirmed and commissions ordered to be issued by the executive officer.

In general discussion it was stated that the work of the fruit fly control had progressed very efficiently and Mr. Giffard deserved great commendation.

Mr. Isenberg stated that a great deal of fruit fly existed on Kauai but he had not found any on Maui.

C. Montague Cooke was appointed as fire warden for Manoa Valley in place of Byron O. Clark, resigned.

Meeting of December 11.

Charles S. Judd, president and executive officer; J. M. Dowsett, Paul R. Isenberg and H. M. von Holt, commissioners.

Mr. Judd stated that Rule IX had been further amended to provide for the shipment of lotus, potatoes and other tubers. He read the draft and asked for action.

On motion Rule IX was rescinded and Rule XI adopted in lieu thereof.

Mr. Judd then read Rule XII in final form, said rule relating to the enforcement of clean culture in infested banana orchards, etc., and requested action. The rule was adopted as read.

(Both of these rules are officially published in this number of the Forester.)

Reports of the Division of Forestry and the Division of Animal Industry were read.

Dr. Norgaard was invited to explain his proposition to quarantine dogs imported into the Territory on account of danger of rabies. Dr. Norgaard went over the matter covered by his report.

Mr. von Holt favored acting at once in accordance with the recommendations of the report. Mr. Isenberg and Mr. Dowsett stated that they had received their copies of the report too late to give proper attention and suggested that the matter go over until it could be carefully considered and in the meantime it be thoroughly threshed out by the newspapers in order to get an expression of public opinion.

It was voted unanimously that action on the proposition be deferred to a special meeting on December 18.

Special Meeting of December 18.

There were present Charles S. Judd, president and executive officer; Paul R. Isenberg, H. M. von Holt and J. M. Dowsett, commissioners.

Reports of Dr. Norgaard and Dr. L. E. Case, assistant Territorial veterinarian, were accepted.

The proposed draft of Rule VI was presented by Mr. Judd and action of the Board requested.

After a general discussion it was moved by Mr. Isenberg that the paragraph requiring a certificate by a veterinarian and one other party as to the health of any dog shipped to the Islands be stricken out and that the required quarantine period be made four months or such longer time as the Board should deem necessary not to exceed six months from the date of embarkation; that the portion of paragraph 1 referring particularly to California be amended so as to read "the United States and foreign countries." This motion was seconded by Mr. von Holt and on vote unanimously carried.

On motion of Mr. von Holt the Rule was approved as amended without return to the Board but subject to the approval of the Attorney General and the Governor of Hawaii. Seconded by Mr. Isenberg and unanimously carried.

Special Meeting of December 29.

Charles S. Judd, president and executive officer; Paul R. Isenberg, J. M. Dowsett and Albert Waterhouse, commissioners, present.

The report of the Division of Entomology was accepted and filed.

Mr. Judd presented Rule VI and stated that but one minor correction had been made by the Attorney General, which he read. Mr. Judd also presented written suggestions of Dr. Norgaard to modify the rule so as to allow the importation of dogs from England and New Zealand without quarantine.

There was a lengthy and general discussion as to the advisability of adopting the suggestions, Mr. Dowsett stating that he believed that if the rule were so modified it would then seem unfair not to modify it as to various States of the United States which might be free from rabies. Mr. Waterhouse thought there should be no modification in any case, inasmuch as dogs would have to pass through infected districts or come in contact with animals not known to be free of the disease while in transit. Mr. Isenberg wanted to go on record as being more afraid of infection from mangy dogs at present roaming the streets than from a remote possibility of rabies, no case of which had ever been known in the Territory. Mr. Dowsett thought the executive officer should ask the Board of Supervisors to enforce the existing regulations for tagging dogs and keeping them off the streets.

It was moved by Mr. Waterhouse, seconded by Mr. Dowsett, that the rule as presented be passed to the Governor for approval.

At this time Dr. Norgaard arrived and was informed by Mr. Dowsett of the views of the Board and its determination not to adopt the suggestions in his letter. After remarks from Dr. Norgaard and further discussion, Mr. Dowsett asked that the question be put before the Board, and on vote it was unanimously carried that the Rule be passed in its present form to the Governor and Attorney General.

Dr. Norgaard stated that a number of suspected cases of spinal meningitis had been reported on Maui, and it seemed advisable for him to make the trip there for necessary investigation. He was therefore excused from the meeting.

Mr. Judd presented Rule XII returned by the Governor and read it to bring minor changes before the Board, upon which it was unanimously adopted in its present form.

On suggestion of Mr. Judd, it was unanimously voted that S. T. Starrett be appointed honorary inspector to assist in the enforcement of Rule XII.

On suggestion of Mr. Judd, it was unanimously voted that H. A. Weinland, the representative from the California State Board of Horticulture, be appointed an honorary inspector to assist in the enforcement of Rule XII.

On suggestion of Mr. Ehrhorn, it was unanimously voted that Joe Clarke (a cotton grower at Waipio) be appointed honorary inspector to assist in the enforcement of Rule XII.

Mr. Isenberg stated that it had been brought to his attention by Julian Monsarrat that some irregularity exists regarding inspection of livestock at San Francisco and particularly a variance in charges for inspection and requested that the Board investigate.

It was unanimously voted that the committee on animal industry be directed to take the matter up with Dr. Norgaard and after a thorough investigation report its findings.

Mr. Judd presented a proposed forestry plan for Honolulu Plantation Company covered by a letter directed by Mr. Hosmer to Jas. Gibb, manager of the plantation.

After general discussion it was decided to be inadvisable to contract according to the suggestions in the letter, as this was an initial undertaking. It was thought that questions of price of stumpage, time for cutting and amount of timber to be cut should be more carefully considered.

The forestry committee was directed to take the matter up with Mr. Hosmer, prepare a proposition along the lines suggested and report back.

On suggestion of Mr. Hosmer, David T. Fleming was appointed district forester and also district fire warden for the district of Kaanapali, Maui.

Mr. Hosmer stated that it had come to his attention that the thimbleberry, a pest known to be as bad as lantana, existing near the volcano on Hawaii, had recently been brought to Honolulu by certain parties and suggested that the Board take action to prevent its maintenance here.

By unanimous vote the executive officer was directed to draft a resolution making it prohibitive to transport the thimbleberry from one island to another or maintain it on this island.

Mr. Isenberg stated there were a great many rabbits at large on Oahu, and after discussion it was unanimously voted that the executive officer be directed to address a letter to the Board of Supervisors requesting them to enforce the regulation regarding rabbits.

Mr. Hosmer stated that the press bulletin of the Forestry Division relative to the planting of trees had become exhausted and advised a new supply. It was ordered unanimously that the bulletin be printed, the cost not to exceed \$30.

REPORT ON FRUIT FLY CONTROL.

Honolulu, January 2, 1912.

To the President and Commissioners, Board of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen:—I beg to submit the following report as to Fruit Fly Control work for the period ending December 31, 1911, viz.:

Inspection.

In addition to the continued systematic inspection of districts 3, 4, 5 and 6, bounded by Punahou street on the east and Liliha street on the west, the following have been partly inspected when possible, viz., districts 1, 2 and 7. These latter areas cover a number of lots in all of which fruit of various kinds is grown, at the distances between the said lots are in many instances far

apart and because of this much of the inspection period is wasted in covering each respective district. Until the staff of inspectors is materially increased it will be absolutely impossible to properly inspect not only the three important districts above named, but also district 8. This latter takes in the Kaimuki and Kapiolani Park residential areas, a section which is at present very badly infected.

General Conditions in Inspected Districts.

The destruction of large quantities of fruit (principally sweet and Chinese oranges, loquats, coffee berries and eugenias, etc., in districts 3, 4, 5 and 6 has brought about a marked improvement in the inspection of these sections. It is, however, to be regretted that there are still a few residents who do not care to strip their orange and other trees of uninfected ripe or part ripe fruit. The majority, however, have heartily cooperated and are still doing what they can to assist the work in hand. If *all* the residents in the above districts worked heartily and hand in hand to keep their orange, coffee and other trees entirely stripped of fruit for the next three months there would no doubt be a marked difference in the infestation of mango and alligator pear trees when these come into bearing shortly. Leaving fruit on the trees at this season and under the improved fruit fly conditions, which at this time exist in the districts above named, only enhances the chances for reinfestation of the whole neighborhood where such fruits have been allowed to remain on trees. Some residents have altogether stripped their trees of the remaining fruits, preferring if possible, to secure comparative immunity from infestation when their alligator pears come into season, while others do not appear to take any interest in this phase of the situation, preferring, it would appear, to leave their part-ripe fruit on the trees and thereby bring about the reinfestation above referred to. That a few scattered residents should take this attitude is to be deplored. Fortunately, such people are in the minority, but in sufficient number to cause much extra work because of repeated inspection of their fruit trees. The scarcity of ripe fruit at the present time in the districts named must compel the adult flies to seek hosts in which to breed, and all green or part-ripe fruit left on the trees will in consequence be attacked long before it would be in a condition for use. Such being the case, it is regrettable that a wholesale clean-up of the balance of the orange crops cannot be inaugurated. Unless the fruit shows signs of infection the inspectors are powerless under the present regulations. On the contrary, should the inspector notice infected fruit on the tree he can and does compel its destruction.

Uninspected Districts.

These are situate to the east of Punahou street and to the west of Liliha, viz., districts 1, 2, 7 and 8, as shown on the map in this department. The lack of funds to employ additional inspectors has prevented more than an occasional visit to these sections. It is found that all these areas, but more particularly districts 7 and 8, are badly infected and need immediate and continued attention. Pending the receipt of additional funds which have been promised your Board, I have temporarily appointed, with the approval of the president, two additional inspectors to cover the last-named districts. These men will commence their duties during the early days of this month, but will have to be laid off on February 1 unless the promised funds are forthcoming. It is to be much regretted that the available funds will not allow of the immediate and permanent employment of a larger staff of inspectors, more particularly as the mango season will be on very shortly and the work of seeing that all fallen fruit is gathered up and destroyed daily will keep a large force busily employed.

General Remarks.

The details of the methods and work laid out and now in use by your director were explained and illustrated to Dr. Wilcox of the Federal Experiment Station, Mr. E. M. Ehrhorn of the Entomological Division of the Board of Agriculture and Forestry, and Mr. O. H. Swezey of the Division of Entomology, H. S. P. A. Experiment Station. These gentlemen were formerly members of the advisory committee of which your director was also a member, and all heartily approve of the present system adopted for the control of the fruit fly within urban and suburban limits. The system referred to has already been freely explained to your Board, and there is no apparent reason to make further reference to it at this time. The system will be improved from time to time as the work goes on, or just as soon as all the precinct boundaries can be definitely settled.

The thanks of the director are due to Dr. Wilcox, Messrs. Ehrhorn and Swezey for assistance rendered in breeding experiments. Up to the present it has been found that among fruits infested with Mediterranean fruit fly are the following: strawberry and all other garden varieties of guava, peach, alligator pear, Chinese orange, mandarin orange, sweet orange, green peppers, fig, rose apple, star apple, mountain apple, coffee berry, wild guava, Chinese plum (*Hoonhia emarginata*), mango, overripe papaya, varieties of lime, baby papaya (*Carica querifolia*), Carissa arduina, Chinese ink berry, grape fruit, prickly pear, eugenia uniflora, loquat and "kamani" (umbrella tree) nut.

On December 26, Mr. Weinland of the staff of the State Horticultural Commission of California, arrived from San Francisco. That gentleman has been delegated by the above-named commission to represent its interests particularly in reference to the ex-

port shipments of all kinds of fruit, including bananas and pines, to the Pacific Coast. Mr. Weinland has hardly had time to enter upon any special line of work, but will no doubt do so very shortly. He is also expected to coöperate with the special line of campaign work now under the supervision of your director.

Respectfully submitted,

W. M. GIFFARD,
Honorary Member Entomological Committee,
Board of Agriculture and Forestry, T. H.

DIVISION OF FORESTRY.

Honolulu, December 30, 1911.

Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I have the honor to submit as follows the report of the Division of Forestry for the month of December, 1911:

H. S. P. A. Meeting.

At the annual session of the Hawaiian Sugar Planters' Association, held the first week of December, I delivered a short address on the need of forest work in Hawaii, with special reference to the sugar plantations, and, in connection with the suggestion that the water revenues from forest reserves be used for forest work, outlined briefly a plan for forest fencing, tree planting and protection by a ranger service on the more important forests.

Following the report of the chairman of the committee on forestry, Mr. Albert Horner, the Association adopted a resolution calling upon the trustees to take action on the following specific recommendations: (1) That a careful investigation be made of the possibility of introducing insect-eating birds into Hawaii; (2) that financial assistance be given the Division of Forestry in its work of propagating seedling trees for corporations desiring large numbers of seedlings; (3) that "it be brought forcibly to the attention of each plantation that it is the judgment of the Association that, for their own interest and strictly from a business standpoint, the individual plantations ought to pay greater attention to tree planting and also to protecting the native forest by fencing;" (4) that "the Association approves the adoption by the Territory, as its definite policy, of the suggestion that as far as practicable the revenues derived by the government from the leases or licenses of waters flowing from the forest reserves be used in forest work, and that the trustees be requested so to recommend to the appropriate Territorial officials"

Forest Planting, Kula, Maui.

In connection with the tree planting requirements of Leases Nos. 742 and 743 of the Land Office for the lands in the Kula District, Maui, known as Waiakoa, Alae 3-4, and Waiohuli, Keokoa mauka tracts, a detailed planting plan was drawn up by the Superintendent of Forestry and delivered early in December to Mr. A. M. Brown, the lessee, and to Mr. Pia Cockett, the manager of the Cornwell Ranch. The leases require that approximately 100 trees be planted for each acre in these two tracts. The plan outlines how this work shall be done, and gives directions as to the several steps in the process.

Exhibit at Poultry Show.

At the annual exhibition of the Hawaiian Poultry Association held December 13 to 16, 1911, the Division of Forestry had an exhibition of seedling trees of various kinds and in different stages, of forest reserve maps and of island woods, the latter being the collection got together for the Alaska-Yukon-Pacific Exposition at Seattle in 1909.

Proposed Forest Planting at Aiea.

On December 13, 1911, I visited the Honolulu plantation at Aiea to inspect the forest planting being done by that corporation on lands leased from the Bishop Estate and to confer with the manager, Mr. James Gibb, in regard to a proposition to plant with forest trees a part of the government land of Aiea within the Ewa forest reserve. A report on this subject was submitted to the Board later in the month.

Proposed Forest Reserves.

On December 19, in company with Mr. Walter E. Wall, government surveyor, I visited the government land of Kulioou on this Island, to determine the boundary of a proposed forest reserve at its mauka end. This matter will be brought before the Board in due course. During the month progress has been made on other pending forest reserve projects, more particularly the proposed reserves on Molokai and on the Waianae hills, Oahu.

Plantation Tree Planting.

During December several additional large orders have been placed by sugar plantation companies for tree seedlings for forest planting. Mr. Haughs' report gives the details of the plants sent out. It is transmitted herewith.

Congressional Vegetable Seed.

The usual annual consignment of free vegetable seed (about 10,000 packets) has been received from the Delegate to Congress, Hon. J. K. Kalaniana'ole. It is now being sent out to the public schools having school gardens and to selected names on the mailing list. Packets of any seed remaining can be had upon application by letter or in person at the Government Nursery. The

seed consists of the more common kinds of vegetables. There are only enough flower seeds for the use of the schools.

Botanical Bulletin by Mr. Rock.

There has just been issued as an illustrated publication of the College of Hawaii (Bulletin No. 1), "Notes upon Hawaiian Plants, with Descriptions of New Species and Varieties," by Joseph F. Rock. In that Mr. Rock is now consulting botanist of this Board and that much of the field work on which this bulletin is based was done while he was still botanical assistant on our staff, it is appropriate that it should be noted here. Copies of the bulletin may be obtained upon application to the College of Hawaii, Honolulu.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF THE FOREST NURSERYMAN.

The principal work done during the month of December is as follows:

Nursery—Distribution of Plants.

	In seed boxes.	In boxes transplanted.	Pot- grown.	Total.
Sold	500	3250	1456	5206
Gratis	500	150	....	650
	<hr/> 1000	<hr/> 3400	<hr/> 1456	<hr/> 5850

Collections for the month of December amounted to \$238.45, itemized as follows:

On account of plants sold	\$ 77.95
From the Division of Animal Industry on account of sale of one yellow mare.....	125.00
On account of use of quarantine station.....	35.50
	<hr/> \$238.45

Plantation Companies and Other Corporations.

Orders received and plants distributed during the month amounted to 12,000 plants ordered and 18,000 in seed boxes and 4000 in transplant boxes distributed.

Experiment Garden, Makiki.

The transplanting of seedlings, sterilizing and preparing soil and doing other routine work constituted the principal work at the station.

U. S. Experimental Planting, Nuuanu Valley.

The two men employed have been hoeing and clearing away the dense growth of Hilo grass from the trees. Owing to the vigorous growth of the Hilo grass in Nuuanu Valley the work of keeping it in check is no small matter, and the two men are kept busy doing the work.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ENTOMOLOGY.

Honolulu, December 31, 1911.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of December, as follows:

During the month, we boarded 32 vessels and found vegetable matter on 18 of them. Careful inspection was made with the following results:

<i>Disposal with principal causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	949	21,941
Fumigated before releasing	36	842
Burned	38	496
Total inspected	1,023	23,279

Rice Shipments.

Sixteen thousand two hundred and fifty-three bags of rice arrived during the month, and being found free from insect pests was permitted to enter the Territory.

One shipment of moulding sand for the Iron Works arrived on the Rithet and after inspection was passed.

Pests Intercepted.

Three large consignments of plants came on the Siberia from Japan, and among the lot we destroyed by burning all the orange trees, about 350, as they were badly infested with the white fly, *Aloyrodes citri*, the blister fungus *Cladosporium citri*, and a serious leaf miner. On some plum trees we found the white peach scale, *Aulpacaspis pentagona*, and a lichen which appears to be a serious pest and would raise havoc with trees here if ever introduced. All soil around the plants was removed, as we have

found many ants in the past, and in this lot grubs of beetles *Melolontha* sp. and also the larvae of probably the Japanese beetle.

One orchid from Manila was destroyed as the roots and bulbs contained larvae and pupae of *Actheopeus aterrimus*, the orchid weevil.

On opening a tub of supposed pickled fruit from Japan a customhouse inspector found that it contained fresh persimmons, and turned the tub over to us for action. We destroyed the lot by burning the fruit at the incinerator.

Inter-Island Inspection.

During the month 54 steamers were attended to going from Honolulu to the other islands. Eighty-two lots of plants were inspected, and of these 24 plants were rejected on account of not coming up to our regulations. Under the new rule, 84 bags of taro and 17 bags of lily root were passed; 44 pkgs. of fruit, 15 pkgs. of vegetables and 1 bag of green arrow root were refused shipment; 1 pkg. of beans was found infested with maggots, and 1 pkg. of cucumbers was also found infested with maggots. These were probably the larvae of the melon fly, but the two lots were destroyed.

Hilo Inspection.

Brother M. Newell, inspector at Hilo, reports that 4 steamers brought vegetable matter consisting of 196 lots and 3839 parcels. One case of sprouts was destroyed on account of aphid infestation and a crate of turnips was destroyed on account of the turnip moth larvae. All the rest was passed as free from pests.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, December 31, 1911.

Hon. C. S. Judd, President and Executive Officer, Board of Agriculture and Forestry, Honolulu.

Sir:—I have the honor to submit herewith the regular monthly report of the Division of Animal Industry for the period December 1 to December 31, 1911.

Rabies Regulation.

As might have been expected, the proposed regulation, imposing a four months' quarantine on all dogs arriving in the Territory when coming from or through countries where rabies is

prevalent, has caused considerable discussion in the local papers. It is, however, worthy of note that, barring a preliminary tone of flippancy and the presentation by one paper of the usual fallacies in regard to the non-existence of such a disease, the press has almost unanimously supported the measure—that is, on the presumption that dogs coming from countries where the disease is officially announced not to exist are to be admitted without detention. This latter point, which was discussed at an extraordinary meeting of the Board on December 29, did not meet with the approval of the members present, who considered that the embargo should apply to all dogs alike, regardless of their coming from infected or uninfected countries. The rule, however, did not receive the required approval of the Governor, who held that it was unconstitutional to quarantine against a disease in a country where it does not exist.

It will be remembered from my last report that two of the leading dog breeding countries were mentioned as being free from rabies, namely, England and New Zealand, and that so long as proper precautions were taken to prevent infection in transit it was considered safe for me to recommend that dogs from these two countries at least should be admitted to the Territory without quarantine. Since that time, however, an article in an English newspaper, Lloyd's Weekly News, by Dr. Andrew Wilson, and entitled "About Hydrophobia," has come to notice. From this article it would appear that an English master of foxhounds had died recently (the paper was dated November, 1911) from hydrophobia as the result of having been bitten by a fox some months previously. This case, which undoubtedly is authentic, is so much more remarkable, as no case of rabies in dogs or hydrophobia in man has been recorded in Great Britain and Ireland since 1902, or nearly ten years ago, and the author's explanation to the effect that "the animal, the fox, is wild, and very unlikely to infect anybody who does not come in close contact with him," does not seem very plausible. A careful perusal of the current English veterinary periodicals containing weekly "Summary of Returns" of diseases of animals officially reported has failed to show the presence of a single case of rabies. That this disease—which must be continuously transmitted from animal to animal in order not to die out, as nearly every case terminates fatally within a few days after the appearance of the symptoms, and before which time the infection cannot be transmitted—should persist among the wild canines for ten years, and especially among the foxes, without a single case of rabies among the dogs or the foxhounds occurring, does not seem likely, especially when it is considered that the English fox is being constantly hunted with hounds, and that no fox is ever killed without inflicting numerous wounds on its natural enemies. I am therefore strongly inclined to believe that either the master of hounds in question did not die

And if that is the case in one place there is no reason why the same condition should not exist in other places in that country. Under these circumstances, it would not seem advisable to grant permits to import dogs from England without quarantine until at least an official explanation of the conflicting statements and conditions can be obtained, and to this end I would suggest that a letter be prepared for the signature of the president and executive officer of the Board and addressed to the Board of Agriculture and Fisheries in London.

I would further respectfully submit that, in case the Board should decide to adopt the rule as amended by the Governor, a paragraph be added requiring prospective importers of dogs to obtain from the Board a permit of importation, said permit to set forth the State, Territory or country whence the dog is to be obtained, the probable port of embarkation, and the routing, so as to insure against infection while in transit.

I would also call the attention of the Board to the necessity of providing kennels at the two ports of entry, Honolulu and Hilo, as the same must be ready to receive the dogs on the day that the regulation goes into effect. Some means must further be provided for the safe transportation of dogs from the ship to the quarantine station. A light covered wagon with three or four compartments will in my opinion be required to meet all incoming boats, as well as a man to drive the same and to care for the dogs while in quarantine.

Instructions to masters of steamships or vessels, as well as to agents for the same, must be issued, either as part of the regulations or as a letter of instruction to the effect that no dog shall be allowed to leave a ship, boat or vessel until the arrival of the inspector, but must be kept securely tied or otherwise confined on board until removed by the inspector or his assistant. Instructions of this nature, in order to be effective, must, in my opinion, form part of the regulation, as nothing short of the penalty clause will make them observed or adhered to.

I would finally submit that the rule be not made to take effect until notice of the same can be sent to San Francisco, Seattle, Portland, Vancouver and other ports of the Pacific, both occidental and oriental.

The cost of keep, while touched on in the regulation, might be made more definite by adding "from \$5 to \$10 per month, according to the size of the animal."

Epidemic on Maui.

At the request of the Deputy Territorial Veterinarian for Maui, as well as the president of the Maui Agricultural Co., I left Honolulu for Maui on December 29, in order to investigate an outbreak of cerebro spinal meningitis among the mules on this plantation. No fewer than ten animals had died within the past three

weeks, and a number were sick or convalescing. The diagnosis which was determined by Dr. Fitzgerald was found to be cor- from hydrophobia, or else that the presence of the disease in Wiltshire, where the case occurred, is being wilfully suppressed. rect, and the cause musty or mouldy feedstuffs, was also veri- fied. A careful examination of the feed bins in various stables revealed the presence of but one sack of badly spoiled bran, a number of the same having previously been removed. Suspicion was, however, directed toward the water supply as a further source of infection, the fact of the disease having occurred in three different stables, widely separated, but obtaining water from the same source, suggesting that the contagion was carried by the water.

The possibility of arresting the outbreak by cutting off this source of transmission seemed plausible, and as all work animals are watered from cement troughs located in the stable yards and are not allowed to drink from ditches or water holes, it was proposed to filter all the drinking water through Pasteur filters. As some of these were on hand, orders were given to have them attached at once, and as these filters will not alone retain the micro-organisms, but will also remove eggs and embryos of in- testinal parasites contained in the water, nothing but good can result from their use, and it is fondly hoped that conditions will improve and that no new cases will develop.

As no report has been received since my return, I am unable to state the result, if any, of this experiment.

Importation of Stock.

As will be seen from the appended list of importations, only six horses were sent to the quarantine station during the past month, while nearly fifty head of horses and mules arrived from Seattle and were admitted after inspection and examination of the accompanying certificates of mallein test.

The sum of \$32.25 was collected for the use of the station for mules and horses kept there beyond the quarantine period. This money has been turned into the treasury and receipt for the same is attached herewith.

The new automobile has arrived and the third general tuber- culin test of all dairy cattle will begin this week.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

IMPORTATIONS SINCE THE LAST MEETING.

S. S. Mexican, Salina Cruz, December 6, 1911—1 ct. chix, K. Chun.

S. S. Lurline, San Francisco, December 13, 1911—2 mares, C. Brewer & Co.; 2 horses, Capt. Whitehead; 1 thoroughbred stallion, A. W. Carter; 8 cts. poultry.

S. S. Manchuria, Orient, December 15, 1911—3 cts. Jap. games.

S. S. Sierra, San Francisco, December 22, 1911—1 saddle horse, A. W. Carter; 1 tank black trout, C. Brewer & Co.; 3 cts. poultry.

S. S. Siberia, San Francisco, December 25, 1911—1 Boston bulldog, Mrs. Walters; 1 Boston bulldog, Mrs. Allen.

S. S. Wilhelmina, San Francisco, December 26, 1911—1 ct. white rats, Leprosy Investigation Station; 1 ct. White Leghorns, E. O. Hall & Son.

S. S. Hyades, Seattle, January 2, 1912—1 grade Jersey cow, Alexander & Baldwin; 17 horses, E. E. Paxton; 29 mules, Alexander & Baldwin (G. Schuman); 1 ct. chix, Mrs. Turrill.

S. S. China, San Francisco, January 3, 1912—1 Spitz dog, Hen Wise.

BY AUTHORITY.

RULE X.

RULE AND REGULATION OF THE BOARD OF COMMISSIONERS
OF AGRICULTURE AND FORESTRY, CONCERNING HORTI-
CULTURAL SANITATION IN AND ABOUT THE CITY OF
HONOLULU.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii, hereby make the following rules and regulations for the purpose of controlling and diminishing or eradicating the Mediterranean fruit fly and other injurious fruit flies and the larvae thereof and preventing or diminishing the damage and loss causable by them.

Section 1. These rules and regulations shall apply to the region bounded as follows, to be known as the quarantine district: On the south by the sea; on the west by the road in Moanalua leading from the tracks of the Oahu Railway and Land Company's railroad mauka on the Honolulu side of Salt Lake to the main road from Honolulu to Ewa; thence along said main road to its junction with the road leading up to the polo field in Moanalua valley; on the north by a line following the sinuosities of the ridges and valleys and running along the most mauka residence lots on the ridges and in the valleys, excepting Tantalus Heights, but including the residence lots on Tantalus; and on the east by the western boundary of the land of Waialae-nui.

Section 2. All fruit, ripe or unripe, whether on the ground or on the tree or elsewhere, and all melons and vegetables, which appear to be infected by the Mediterranean fruit fly or any other injurious fruit fly or the larvae thereof within the quarantined district shall daily be collected by the occupant, or, if no occupant, by the controller of the property on which such fruit, melon or vegetable exists, and thoroughly destroyed by burning or by such other effective means as the duly appointed agents of the Board of Agriculture and Forestry may deem sufficient, or so treated as effectually to destroy any larvae therein of any such fly, or, if within the garbage collection limits, placed in suitable can containers which shall be set conveniently for the garbage collectors.

Section 3. Inspectors and other duly appointed agents of the Board of Agriculture and Forestry are hereby empowered to enter and inspect any and all premises within the quarantined district and enforce the provisions of Section 2. They are also hereby empowered to remove or cause to be removed from fruit trees, and shrubs and plants, any and all fruit or vegetables which are infected with the Mediterranean or other fruit fly or the larvae thereof and to have the same destroyed, treated or disposed of in the manner prescribed in Section 2.

Section 4. No fruit, melon or vegetable infected by any such fruit fly or the larvae thereof shall be sold or offered for sale within the quarantined district.

Section 5. Any fruit, melon or vegetable, found exposed for sale in the quarantined district which appears to be infected by the larvae of the Mediterranean or other fruit fly, may be seized by any inspector or other duly appointed agent of the Board of Agriculture and Forestry and destroyed.

Section 6. No fruit, melon or vegetable shall be thrown, discarded or placed on any sidewalk, road, thoroughfare, road-gutter, river-bed, sea-beach, vacant lot or park, within the quarantined district except as aforesaid.

Section 7. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars, as provided by Section 390 of the Revised Laws, as amended by Act 82 of the Session Laws of 1905, and Act 112 of the Session Laws of 1907.

Section 8. This rule shall take effect upon its approval by the Governor.

Approved:

W. F. FREAR,
Governor of Hawaii.

Honolulu, Territory of Hawaii, November 14th, 1911.

BY AUTHORITY.

RULE XI.

RULE AND REGULATION BY THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY CONCERNING THE PREVENTION OF DISTRIBUTION OF INSECT PESTS FROM OAHU TO THE OTHER ISLANDS.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby make the following rule and regulation:

Section 1. For the purpose of preventing the spread to other islands in this Territory of insect pests which have established themselves on the Island of Oahu, all persons and corporations are hereby prohibited from carrying or shipping from said Island of Oahu to any other island in said Territory, any fruit, vegetable, melon or root, except fruits, melons, roots or vegetables in original packages imported into this Territory from other places; and all persons and corporations are hereby prohibited from carrying or shipping any plant or any soil attached to any plant or any other soil, from said Island of Oahu to any other island in this Territory; provided, however, that plants and soils which have been thoroughly fumigated or sterilized under the supervision of the Superintendent of Entomology or his assistants, and taro, lily-root, tubers and roots which are to be used for food purposes only, upon inspection by the Superintendent of Entomology or his assistants, may be so carried or shipped when properly tagged and certified by any such officer to be free from insect pests.

Section 2. Any person or corporation violating the above rule shall be guilty of a misdemeanor and shall be punished by a fine not to exceed Five Hundred Dollars as provided by Section 390 of the Revised Laws as amended by Act 82 of the Session Laws of 1905 and Act 112 of the Session Laws of 1907.

Section 3. Rule No. 9 of the Board of Commissioners of Agriculture and Forestry adopted and published on the 28th day of June, 1911, is hereby rescinded.

Section 4. This regulation shall take effect upon its approval by the Governor.

Approved:

W. F. FREAR,
Governor of Hawaii.

Honolulu, Territory of Hawaii, December 18, 1911.

BY AUTHORITY.

RULE XII.

RULE AND REGULATION OF THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY CONCERNING THE CONTROL OF INSECT AND OTHER VEGETABLE PESTS IN THE TERRITORY OF HAWAII.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby make the following rules and regulations for

the purpose of controlling and diminishing or eradicating injurious insects, blights, scales and pests, injurious or liable to become injurious, to trees, plants, or other vegetation of value and the fruit thereof.

Section 1. In view of the presence of injurious insects, blights, scales and pests which are a detriment or which may become a detriment to the agricultural industries of the Territory and for the purpose of preventing or diminishing the damage and loss causable by them, all inspectors and other duly appointed agents of the Board of Agriculture and Forestry are hereby empowered to enter at all reasonable times any and all farms, orchards and premises in said Territory, where there are agricultural growths and products, for the purpose of inspecting trees, plants, cuttings, vines, fruits, vegetables, tubers, roots, seeds and other agricultural growths and products thereon.

Section 2. Whenever such injurious insects, blights, scales, or pests are discovered on any premises, inspectors and other duly appointed agents of the Board of Agriculture and Forestry shall advise the growers, of the crops on such premises as to the best methods of reducing the damage that may be caused thereby, and all fruits, plants, cuttings, vines, vegetables, tubers, roots, seeds or leaves infected with any such insect, blight, scale or pest, shall be destroyed at once by the grower thereof by methods prescribed by the Superintendent of Entomology upon the request of any such inspector or agent.

Section 3. All inspectors and other duly appointed agents of the Board of Agriculture and Forestry are hereby empowered to seize and destroy any fruit, plant, cutting, vines, vegetables, tubers, roots, seeds, or leaves infected with any such insects, blights, scales or pests found in any shipment in any part of the Territory.

Section 4. Any person, firm or corporation violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars, as provided by Section 390 of the Revised Laws, as amended by Act 82 of the Session Laws of 1905, and Act 112 of the Session Laws of 1907.

Section 5. This rule shall take effect upon its approval by the Governor.

Approved:

W. F. FREAR,
Governor of Hawaii.

Honolulu, Territory of Hawaii, December 30, 1911.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHRLHORN,
Superintendent.

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No. 2.

The Agricultural News (West Indies) for November 25 contains a leading article of two pages on "The Assimilation of Nitrogen by Rice," which consists mainly of a review of Bulletin No. 24 of the Hawaii Agricultural Experiment Station.

A machine for separating and straining lime juice, which costs only \$100 and has a capacity of 300 gallons an hour—equivalent to about forty barrels of limes—has been proved successful at the botanic station, Dominica. It is surprising that the growing of limes, on a commercial basis, is greatly neglected in Hawaii where the demand for the fresh fruit is generally ahead of the supply. Both limes and lime juice ought to be articles of profitable export from these islands.

THE COTTON WORM.

Hawaii was not singular the past year in receiving an invasion of the cotton boll worm, although coming in the nascent period of the revived industry—after suspension of enterprise in that product for more than a generation's lifetime—the blow fell with peculiar force here. A letter to the Imperial department of agriculture, West Indies, from W. D. Hunter, in charge of the southern field crop insect investigations of the bureau of entomology of the United States department of agriculture, stated that a most extraordinary outbreak of the cotton worm (*Alabama argillacea*) had been experienced in the United States during the past cotton-growing season, the cotton fields from Texas to the Atlantic having been completely defoliated. Mr. Hunter was endeavoring to ascertain the sources from which the enormous numbers of these moths had come. He believed that in one case they migrated into the United States along the Mexican coast, and he raised the question as to whether another migration might not have taken place from the West Indies. In answer to this suggestion the Agricultural News says, "It does not seem likely that the West Indies could have furnished any large number of cotton moths during the past two or three seasons, as this insect has not been very abundant, in the Lesser Antilles at least." From articles in American periodicals the News tells of the capture of a number of moths of the cotton worm at Amherst, Mass., and the appearance of myriads of them in Philadelphia, on which Dr. Henry Skinner is quoted as saying: "There were many thou-

sands of them and nearly all that I saw were in perfect condition as though just from the chrysalis. These moths are known to migrate in numbers but it is quite strange if the great numbers seen here came from the cotton districts of the South. The moths in some places appeared to create considerable alarm, people thinking they would cause damage to plant life here."

The Agricultural News observes: "The fact that the abundance of the cotton worm has been observed in these northern latitudes, at the end of the season in which this insect has been so destructive in the South, might indicate that it occurs there as the result of migration directly from the cotton fields. On the other hand, the fact that the moths were remarkable for their perfection and freshness again raises the question as to whether the cotton worm has another food plant than cotton. The answer to this question would be of considerable interest to West Indian planters for, although uncultivated or wild cotton furnishes food for the cotton worm and thus helps it to survive periods when no cultivated cotton is being grown, it is obvious that additional food plants would be of value to the cotton worm during this unfavorable period." The problem thus raised would appear to be pertinent to the matter of the visitation Hawaii has experienced.

Clean culture is a living issue elsewhere than in Hawaii. Our tropical agriculture exchanges from opposite sides of the world—the Orient and the Antilles, as well as Europe—are devoting much space to insecticides and methods of their application, and admonitions to destroy all infected fruits are also becoming general.

Among the latest outcomes of governmental assistance in the marketing of small farming products in this Territory, in charge of S. T. Starrett, is the coöperation of dairymen in the Hilo district for the establishing of a central creamery to supply not only the local but the Honolulu market with fresh butter of first quality. In this connection it is interesting to notice, in a late number of the *Tropical Agriculturist* (Ceylon) a long selected article on the great development of the dairy industry of Denmark through the adoption of just such coöperation. It was instigated in that country by the failure, some years ago, of its corn-growing industry. Now Denmark is exporting millions of dollars worth of dairy products as the direct result of the coöperative creameries.

There is every promise, according to a news article in the *Hawaiian Star*, that Mr. Starrett's market superintending will eventuate in not only restoring the Hawaiian banana industry but developing it to an extent never before approached. One condition of success is of course clean culture, as well as clean and otherwise efficient packing, for which the superintendent is working hand in hand with the other official and private clean culturists.

Rubber seems to be the word everywhere in the tropical world just now, and Hawaii appears to have good promise of keeping its hand in the industry—comparatively small as the beginning here may be. Periodicals of tropical agriculture everywhere, as well as ordinary news prints in tropical countries, are giving much space to technical discussions of rubber growing. Last year, as readers of the Forester are aware, a number of this magazine was devoted mainly to a full report of the annual meeting of the Hawaiian Rubber Growers' Association, and it will also be remembered that the Forester has noted in exchanges, also in a book published in London, very considerable mention of the rubber growing experimentation done in Hawaii. Late mails have brought some articles on rubber, quotable in reasonable compass as well as many too lengthy for these pages, and of the former, as space will permit, our readers shall have the benefit.

KEEPING THE BOYS AND GIRLS ON THE FARM.

To keep the farmers' boys and girls in the country is a problem affecting every agricultural district in the United States. The universal opinion of the farmers throughout the country, as voiced to the National Country Life Commission was that the present system of education in the district schools in a large measure is responsible for the exodus of the youth of the country to the city; that the curriculum, owing to its failure to instruct in the spirit of the farm is strongly influencing the children away from rather than toward rural pursuits.

Recognizing fully the importance of the problem of conserving for the country a larger proportion of its young people and of directing them in childhood to appreciate the dignity and independence of farming as a profession, Secretary Fisher of the Department of the Interior has authorized the Reclamation Service to coöperate with the Department of Agriculture, the various state and county authorities, in a practical plan which it is believed will materially promote a solution of this problem on the irrigation projects of the government.

On a number of these projects the old-fashioned, one-teacher district schools have been eliminated and consolidated, or centralized graded schools have been established. Sufficient land has been set aside or donated adjacent to these schools to permit the platting of small tracts for planting. A course in elementary agriculture is to be taught and an actual demonstration of irrigation and cultivation is to be given with prizes for the best results. To further these plans the Reclamation Service will furnish free of charge the water for irrigation; the Department of Agriculture and the State Experiment Station will supply seeds and expert instructors. This western experiment will be viewed with absorbing interest by the farmers all over the land.

THIRD REPORT OF DIRECTOR OF FRUIT FLY CONTROL.

To the President and Commissioners Board of Agriculture and Forestry, Honolulu, T. H.

GENTLEMEN:—I beg to submit a report of the work in re "Fruit Fly Control" for the month ending January 31, 1912, viz.:

INSPECTION.

Upon request the President authorized me to engage two more inspectors at the beginning of January and in consequence I have been able to thoroughly inspect the areas covered by our outlying Districts 1 and 2 to the west and 7 and 8 to the east of Honolulu.

Last month I reported these sections as badly infested with fruit fly but am now pleased to report that strenuous destruction of infected fruits has shown a marked improvement in all these four districts. Continued inspection in all the precincts of Districts 3, 4, 5 and 6 has met with excellent results. Were it not for a few scattered residents who apparently refuse to coöperate in the clean culture methods adopted by your Board, and some others who throw all the burden of the work of picking and destroying infested fruit upon the inspectors, the present conditions would be still better than they are. On the whole, however, all the districts have been fairly well cleaned up of the ripe fruits, etc., of the season. Among these are principally the Hawaiian orange, Chinese orange, mandarin orange, guava, lime, loquat, carambola, fig, green pepper, coffee berry, kamani seed, papaya, eugenia and others. The mango season will be on very shortly, a number of trees already showing large size green fruit. Judging from the flowering and setting of the fruit on the mango throughout this island I should say that the crop is going to be an unusually large one. It will be interesting to see whether or not, because of clean culture methods, the fruit this year will show a diminution of fruit fly attack over that of last year. As previously stated, were it not that there are residents scattered throughout each precinct who cause continued inspection on their premises and fail to coöperate, the chances of re-infestation would be minimized. With such doubtful conditions, however, the re-infestation of small areas may, during the mango season, cause altogether unnecessary fruit fly conditions in adjacent sections. Many poor tenants of the smaller fruit and vegetable gardens have given us much extra work because of their inability to secure and pay laborers to gather and destroy quantities of infected fruits and vegetables. In such cases as these I have had to double up the inspectors so that these might assist such tenants in picking and carting away quantities of the infested material to the incinerator.

FINANCES AND PAY ROLLS.

Since my last report advices have been received from the State Horticultural Commissioner of California that the sum of \$4000 was available from his appropriation for the period ending July 1st for the purpose of employing inspectors. Your director has satisfactorily arranged with Mr. Weinland, the representative of said Horticultural Commissioner, a system whereby the expenditure of the California funds will be kept separate from that made from our own appropriation. An accounting from this special fund represented by the pay roll, will be forwarded by Mr. Weinland to the California authorities monthly. As it is particularly required that these special expenditures shall not include incidental expenses these latter will have to be expended from our own appropriation. The incidental expenses, which so far have been principally for printing, advertising and office supplies, will from now on be largely increased as it will undoubtedly be necessary to do considerable hauling of fallen fruit from certain districts to the incinerator. The districts referred to are of course those situated outside of the County garbage limits. In view of the above facts our own pay roll will show a proportionately less number of inspectors than that of California, but on the other hand the incidental expenses will, for a season, be much larger than heretofore. Since my last report two additional inspectors have been appointed, the total number on February 1st being 8. Five of these are on the California pay roll and three on our own.

BREEDING EXPERIMENTS.

Since last report the Entomological Department has succeeded in breeding the Mediterranean fruit fly from the fruit of carambola and brown persimmon. In the latter case a single fruit was handed us, it having been the only one maturing on a newly introduced species. The above fruits therefore may now be added to the long list of those which we have found to be attacked by Mediterranean fruit fly.

THE PEST ON HAWAII.

I am sorry to report that on the 31st we bred out the Mediterranean fruit fly from Chinese oranges which I received from a resident in the Kohala district on Hawaii. This is the first authentic knowledge we have of the absolute establishment of this fruit fly on that island although we have of course known that the common Melon fly, which has been in the Territory for so many years, was established on all the islands. The fact that the Mediterranean fruit fly is now already in one district and possibly in others on Hawaii will make the system of inspection at ports of destination a much more laborious one as "clean cul-

ture" methods, together with a systematic district inspection will have to be added to that which was originally contemplated. This also applies to Molokai and Kauai where I reported a while ago that the fruit fly had already become established. So far we have not received any questionable material from the island of Maui although it may be possible that the fly has established itself there as well as on the other islands. It is to be regretted that no funds were available to start the insular port inspection when it was first suggested by me two or three months ago. Failing a sufficient appropriation to efficiently carry out such necessary inspection work as was required to keep the other islands free from infestation I made an appeal to certain people who are largely interested in diversified industries on Maui and Hawaii with a view to having them "get together" and provide funds to meet the necessary expenses incurred for this insular port inspection. This appeal was made verbally and in writing some weeks ago but so far I have heard of no serious organization on the part of these agriculturists. As regards the infestation in the Kohala district I would state that I am writing to a prominent resident in that district informing him of the methods to be adopted to keep all fallen and infested fruit picked and thoroughly destroyed daily. I shall also ask him to give as much publicity to the instructions sent as is possible in a country district. It is quite possible that if the infestation is confined to Kohala and is of only recent occurrence radical measures such as stripping of all fruit trees including wild guava may delay its advent in other districts on Hawaii. Certain fruits sent us from Kona and Hilo have so far failed to breed out the Mediterranean fruit fly although there is one very questionable case which, when the breeding is complete, may prove to be an infestation of the Kona district. It is, however, somewhat early to predict on this particular case.

Respectfully submitted,

W. M. GIFFARD,
Honorary Member of Entomological Committee.

BOARD OF AGRICULTURE AND FORESTRY.

Minutes of a meeting of the Board of Commissioners of Agriculture and Forestry held in the Senate Chamber, Capitol Building, Honolulu, on Monday, January 8, 1912, at 2 o'clock p. m.

Present—Charles S. Judd, President and Executive Officer; J. M. Dowsett, H. M. von Holt and Albert Waterhouse.

Mr. Judd among divisional reports presented the supplementary report of Mr. Hosmer of the Division of Forestry in reference to the verbal application of Mr. Eben Low for an extension of time under his agreement with the Board to remove all sheep and goats from the island of Kahoolawe. After a general discussion in which it was stated that the weather at this season of the year might prevent Mr. Low from accomplishing the work within a shorter period and that the Board would prefer to allow ample time in order to be certain that all sheep and goats would be removed, it was moved by Mr. Dowsett that the extension of time be allowed to Mr. Low until April 30, 1912, to remove all sheep and goats; the motion was seconded by Mr. von Holt and on vote unanimously carried.

Rule on Rabies.

Mr. Judd presented Rule VI, which had been returned by the Governor with an alteration permitting the importation of dogs without quarantine restrictions from countries where rabies does not exist. Mr. Judd stated that the Governor had given as his reason for altering the rule that it would be unconstitutional unless such modification was made.

After a general discussion in which several changes of the rule were suggested it was moved by Mr. Dowsett and seconded by Mr. Waterhouse that the Committee on Animal Industry be directed to take the matter up with the Governor and ascertain in just what way Rule VI would be unconstitutional if passed without the change made by the Governor, and that the Committee on Animal Industry draw an entirely new rule which would cover all possible points and submit it at the next meeting of the Board. On vote the motion unanimously carried.

Rule on Thimbleberry.

Mr. Judd presented a draft of Rule XIII to control the plant pest, Thimbleberry, and read same to the Board. After a general discussion it was decided that the rule should be strict in the carrying of the plant between any of the islands and upon motion of Mr. Dowsett, seconded by Mr. von Holt and unanimously carried, the President and Executive Officer were instructed to take the matter up with the Attorney General and Governor and prepare a sufficient rule and

Fruit Fly Control.

The report of Mr. Giffard, Director of Fruit Fly Control, was presented by Mr. Judd and read. Mr. Dowsett and Mr. von Holt remarked upon the efficiency of the work and stated that in their opinion Mr. Giffard was to be specially commended. Mr. Dowsett said that the question of the State of California contributing to the funds for this campaign had not yet been definitely settled but it was hoped that money from this source would soon be available and that it would then be possible for Mr. Giffard to enlarge his working force and accomplish more than he could with present funds.

On motion of Mr. Waterhouse, seconded by Mr. von Holt and on vote unanimously carried the report was accepted and ordered to be filed.

Mr. Judd stated that the Forestry Committee was not ready to report upon the Forestry plan for Honolulu Plantation and would require further time.

Application to Cut Honohono Grass.

Mr. Hosmer stated that he had received an application from Mr. E. O. Farmm for permission for his brother, T. F. Farmm, to cut honohono grass on Tantalus. It was stated by Mr. Hosmer that some time ago the Board had prohibited the cutting of grass on Tantalus and it did not now seem advisable to allow it to be done. On motion of Mr. von Holt, seconded by Mr. Waterhouse and on vote unanimously carried it was decided to take the matter up at the next meeting of the Board.

Minutes of meeting of Board of Commissioners of Agriculture and Forestry, held in the Senate Chamber, Capitol Building, Honolulu, January 25th, 1912, at 2 o'clock p. m.

Present—Charles S. Judd, President and Executive Officer; Paul R. Isenberg, J. M. Dowsett, H. M. von Holt and Albert Waterhouse, members; R. S. Hosmer, E. M. Ehrhorn and V. A. Norgaard.

Honohono Grass.

Mr. Judd requested action of the Board regarding the cutting of honohono grass on Tantalus and after general discussion it was moved by Mr. Isenberg and seconded by Mr. Waterhouse that the former action of the Board prohibiting the cutting of honohono grass remain unchanged. Upon vote unanimously carried.

Mr. Judd presented a report of the Entomological Committee, dated Jan. 22, 1912.

ANIMAL QUARANTINE STATION AT HILO.

Mr. Judd presented a recommendation by the Finance Committee that owing to a lack of funds the building of the proposed animal quarantine station at Hilo be not undertaken during the present fiscal year, but that if possible a special fund be allotted for the purpose when the next regular allotments from the Conservation Fund of the Board are made.

Upon motion of Mr. Isenberg, seconded by Mr. von Holt and on vote unanimously carried the recommendation was adopted by the Board.

The Thimbleberry Rule.

Mr. Judd presented and read Rule XIII in full. Upon suggestion of Mr. Waterhouse and Mr. Dowsett slight amendments were made to the draft and on motion of Mr. Dowsett seconded by Mr. Waterhouse and on vote unanimously carried the amended draft was approved by the Board and the Executive Officer instructed to submit the rule to the Governor for final approval.

Fruit Fly Control.

Mr. Judd presented a letter which he had prepared to be sent to A. J. Cook, California State Commissioner of Horticulture, in regard to Fruit Fly Control work and asked the Board for its approval thereof. After a lengthy discussion as to clean culture and manner of enforcement of Rule XIII and the probable effect of action or lack of action upon the fruit industries of the islands it was moved by Mr. Waterhouse and seconded by Mr. Isenberg that the Entomology Committee take the matter up with full authority to act. Upon vote unanimously carried.

Rule on Rabies Adopted.

Mr. Judd presented Rule VI in final form and read same in full. Upon motion of Mr. Waterhouse, seconded by Mr. Dowsett and on vote unanimously carried Rule VI was approved and the Executive Officer was instructed to submit same to the Governor for approval and signature.

DIVISION OF FORESTRY.

Honolulu, Feb. 10, 1912.

Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

GENTLEMEN:—I have the honor to submit herewith the routine report of the Division of Forestry for the month of January, 1912:

Forest Reserve Matters.

During the month I made several short field trips in connection with matters of locating forest reserve boundaries and fencing. The localities visited were Palolo and Nanakuli Valleys and the land of Aiea, Oahu, and that portion of the land of Kehena 2, Kohala, Hawaii, for which the Government has instituted condemnation proceedings. On this last trip, January 9-12, the party consisted of Mr. Arthur G. Smith, Deputy Attorney General, who is conducting the case for the Government, and Mr. L. von Tempsky of Maui, who went along to give expert testimony as to the value for ranching of the area in question.

Early in the month Mr. Haughs and I made a hasty visit with Mr. A. W. Van Valkenberg, to his forest plantation at Kunia, Oahu, where groves of a number of species of Eucalypts are making excellent growth. In time this plantation should yield large quantities of wood and timber.

During January progress has been made with a project to plant forest trees on the portion of the Government land of Aiea that lies within the Ewa Forest Reserve, the actual work to be done by the Honolulu Plantation Company under a coöperative agreement whereby the plantation will later be reimbursed in fuel wood for the money expended in the planting.

Plantation Tree Planting.

The Division of Forestry continues to send out considerable numbers of forest tree seedlings to sugar plantation companies and others doing extensive tree planting. Sixty-eight thousand seedling trees left the Nursery in January for this purpose. For further details in connection therewith Mr. Haughs' report, transmitted herewith, should be consulted.

Botanical Exploration.

Mr. J. F. Rock, consulting botanist of this Division, is still on Hawaii, where he is having a successful collecting trip in the districts of Kau and Kona. He writes that he has secured much additional herbarium material, including some very rare plants, and also that he has collected a considerable quantity of seed of native Hawaiian trees. This is particularly welcome news for these seeds can be used to very good advantage in exchanges with botanic gardens from whom we desire special favors.

Progress is being made on Mr. Rock's proposed book on Hawaiian trees. It is probable that the manuscript can be sent to the printer soon after his return to Honolulu.

Congressional Vegetable Seed.

During January, the Congressional seed received from the Delegate to Congress, was distributed to the public schools and to a selected list of persons on our mailing list. Some packets still remain which may be had upon application at the Government Nursery.

Street Tree Planting.

On the evening of January 30, I read a paper on "Street Tree Planting," before the Out Door Circle of the Kilohana Art League, the members of which have taken up actively the question of civic improvement.

Very respectfully,

RALPH S. HOSMER,
Supt. of Forestry.

REPORT OF THE FOREST NURSEYMAN.

The following is a report of the principal work done during the month of January:

Nursery.

Distribution of Plants.

	In seed boxes	In boxes transplanted	Pot grown	Total
Sold . . . . .	...	200	1400	1600
Gratis	450	1800	4435	6685
	<hr/> 450	<hr/> 2000	<hr/> 5835	<hr/> 8285

Collection on account of plants sold amounted to \$26.85. From the Division of Animal Industry for use of Animal Quarantine Station, \$32.25. Total, \$59.10.

Plantation Companies and Other Corporations.

We have received during the month orders for 12,000 trees and we have delivered 68,000, consisting of different species of Eucalyptus and Ironwood (*Casuarina equisetifolia*).

Experiment Garden, Makiki.

Owing to the heavy demand for trees during the past two or three months our stock for general distribution is considerably reduced, and the men at this station, also at the nursery, have been working on the potting and transplanting of trees to replenish our stock.

U. S. Experimental Planting, Nuuanu Valley.

The two men are kept busy hoeing and clearing away the grass from the trees. More trees are now ready at the Makiki Station for this work and these will be planted during February.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ENTOMOLOGY.

Honolulu, Jan. 31, 1912.

*Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.*

GENTLEMEN:—I respectfully submit my report of the work of the Division of Entomology for the month of January as follows:

During this month, we boarded 27 vessels and found vegetable matter on 21 of them and two sailing vessels brought sand in ballast which was clean and free from insect life. Careful inspection of all shipments was made with the following result:

<i>Disposal with principal causes</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests.....	610	17,809
Fumigated before releasing.....	32	420
Burned	31	176
Total inspected	673	18,405

Rice Shipments.

18,140 bags of rice arrived during the month and being found free from insect pests was permitted to enter the Territory.

Pests Intercepted.

Among a shipment of plants from Japan we found 100 orange trees which were badly infested with *Cladosporium citri*, *Alcyrodes citri* and a Tineid leaf miner, the trees were confiscated and burned. On a small shipment of Orchids and plants from Java we found some Mealy bugs (*Pseudococcus azaleae*) which were killed by fumigation. Orchids from Manila were over carried to San Francisco and returned here during the month. We found the plants in a very poor condition, nearly all dead from dryness, nevertheless all the soil was removed and the lot fumigated. On another plant shipment from Japan we found many trees badly infested with the White Peach scale (*Aulacaspis pentagona*), a

large Lecanium scale, (*Eulecanium magnoliarum*) and some Brown velvet Lichen, all the trees were burned. Some cotton seed arrived by mail from the United States and was first fumigated before delivery as a precautionary measure against the Cotton Boll weevil (*Anthonomus grandis*).

Hilo Inspection.

Brother M. Newell, Inspector for Hilo, reports the arrival of 8 vessels, 4 of which brought vegetable matter consisting of 107 lots and 2331 parcels; which being free from pests were passed. One 50 bag lot of potatoes was ordered cleaned from soil before delivery.

Inter-island Inspection.

During the month of January 70 steamers were attended to and the following shipments were passed on:

298 bags of Taro.
57 cases of Plants.
5 bags Seed Cane.
2 bags Cocoanuts.

Total..... 362 packages.

The following packages were refused shipment:

28 packages of Fruits.
15 packages of Vegetables.
6 lots of Plants.
1 case of Lilyroot (not cleaned).

Total..... 50 packages rejected or destroyed.

On January 23 one package of grapes was found infested with maggots.

Respectfully submitted,

E. M. EHRHORN,
Supt. of Entomology.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, Feb. 7, 1912.

Hon. C. S. Judd, President and Executive Officer, Board of Agriculture and Forestry.

SIR:—I have the honor to submit herewith the report of the Division of Animal Industry for the month of January, 1912:

Quarantine of Dogs.

The regulation imposing a quarantine of 120 days on all dogs coming from or through a country where rabies is prevalent received the approval of the Governor on January 27th and will go into effect on March 1st.

Pursuant to verbal instructions from the President of the Board I communicated with troop farrier Albert Davenport of Troop N, 5th U. S. Cavalry, who had been highly recommended to me for the position of caretaker of the Animal Quarantine Station. The increased duties of the incumbent of this position, which from March 1st will require the meeting of all incoming steamers and other vessels for the purpose of securing and transporting to the quarantine station all dogs intended for importation has necessitated the employment of a young and active man, and I am pleased to say that I believe the proper party has been found.

I took Mr. Davenport to the station and received from him valuable suggestions in regard to the construction of kennels, kitchen and infirmary for the care and keep of the dogs. I afterwards took him to the office of the president and various members of the Board but failed to find any of them in and as he had to return to Schofield Barracks on the afternoon train I requested that he report to me again as soon as he can obtain the required furlough. Mr. Davenport's retirement, though regretted, has been approved by his regimental officer, and his application has been forwarded to Washington for approval. In case the same should not be returned by March 1st the applicant is entitled to one month furlough for which application has already been made to take effect on March 1st. I feel therefore confident of having his services at the disposition of the Board by the time the rabies regulation goes into effect.

The construction of kennels and paddocks according to plans submitted herewith awaits the approval of the Board, and will be begun immediately, so that safe and comfortable premises may be in readiness to receive the dogs which may arrive after March 1st.

A light wagon with canvas top or hood, for the transportation of the dogs, and a horse to draw the same, will also be required, and the sum of \$400 or so much thereof as may be necessary for the purchase of the same is hereby applied for.

Annual Test of Dairy Cattle.

The third annual test of the dairy cattle of the City and County of Honolulu began on February 1st and will be continued from now on as fast as the work of the Division will permit. The first installment of 1000 doses of tuberculin was received from Washington on February 1st and is now being evaporated to a concentration of one-third of its original volume thereby making

it applicable to the intra-dermal test. This latter method of testing continues to give absolute satisfaction especially since a method has been evolved by this Division for the speedy retest of any questionable reactions. This consists in the injection—intra-dermally—in a fold of skin on the side of the neck of an equal dose of concentrated tuberculin, as that ordinarily injected into the sub-caudal fold. Owing to the thickness of the hide on the side of the neck there is little or no danger of the point of the needle penetrating the cutis, making the injection sub-cutaneous instead of intra-dermal. The neck region, however, is less accessible or convenient for injection under ordinary circumstances and the resulting reaction is less conspicuous, requiring palpitation or even accurate measuring in its interpretation. But where there is the slightest doubt about the result of a sub-caudal injection the neck injection should be resorted to immediately and an examination 48 to 72 hours later will dispel any doubt as to the diagnosis. This was beautifully demonstrated on a high priced Holstein bull recently imported which failed to give a characteristic reaction to the sub-caudal injection even though the local swelling indicated the possible presence of infection. The animal was then injected on the side of the neck and 50 hours later the double fold of the hide at the place of injection had assumed a thickness four times greater than original. This swelling was hardly noticeable so long as the hide was allowed to remain flat on the neck and only became conspicuously manifest when the hide was raised in a fold between the index finger and the thumb. With this neck test to assist in doubtful cases I feel absolutely confident that the intra-dermal form of the tuberculin test may be considered absolutely reliable as a means of diagnosing bovine tuberculosis.

Like in the former general tests the coöperation of the local Board of Supervisors, through the City and County Physician, has been extended through the assignment of Milk Inspector Richards to assist in making the tests. His personal acquaintance with all the milk producers and his intimate knowledge of the composition of the various herds has been of good value to us in carrying on this work.

Glanders.

I regret to report the appearance of glanders in a stable where the disease has been known to occur on previous occasions, but where no case has developed for more than two years. As this recrudescence of the disease after such a long interval is indicative of the presence on the premises of an old "carrier" of the infection—that is, an infected animal exhibiting no symptoms of the disease—it has been decided to test all the animals in the stable as well as such animals which have been in contact with these. This occasion will lend an opportunity to apply a new

method of mallein testing, the ophthalmic test, which in its way is as simple as the intra-dermal test for tuberculosis, but which is considered far more reliable than the old sub-cutaneous method, so much so in fact that it has already been officially adopted by several European governments. If it is proven to be as here there are strong hopes that the mallein testing of horses and mules for export to these islands may be extremely simplified and the objections of dealers and importers to this test be minimized.

Importations of Live Stock.

The approved report of the Assistant Territorial Veterinarian covering the importation of live stock during the month of January, as well as an itemized report on the tuberculin test of cattle is herewith appended.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

SUPPLEMENTARY REPORT OF VETERINARIAN.

Honolulu, Feb. 12, 1912.

Hon. C. S. Judd, President and Executive Officer, etc.

SIR:—Since finishing and distributing the monthly report of the Division of Animal Industry I have received a copy of the "Proceedings of the American Veterinary Medical Association," pertaining to the meeting held at Toronto, Canada, Aug. 21-24, 1911, where I had the honor to represent the Board as a delegate. The volume, covering more than 700 pages, contains much of interest to this Board, at least in so far as the Division of Animal Industry is concerned, including a paper presented by me on the livestock sanitary conditions in the Territory of Hawaii, which appears under the heading of "Report of Special Committee on Insular Possessions."

The purpose of this addenda is however to show the present status of rabies or hydrophobia in the United States and Canada in so far as the resident secretaries of the Association have reported thereon. It appears that reports were received from 23 resident secretaries, of which twelve only mention rabies, and of these again only two, both from New England states, report the absence of the disease during the past year. This does not indicate that rabies occurred in only ten States, but shows on the contrary, that the disease is on the increase in many localities, and in some cases to an alarming extent. Pennsylvania, for instance, made an appropriation of \$10,000 for the suppression of rabies (1911-1912), an increase of \$5000 over the preceding period

(1909-1910), and a number of other States now supply the anti-rabic treatment free of charge to resident citizens.

From these reports I beg to quote as follows:

Connecticut, p. 117: "No cases of anthrax or rabies have occurred since my last report."

Colorado, p. 119: "Rabies is on the increase and many cases have been reported from the laboratories of the state college and the university. No restrictions have been placed on dogs, save in one or two of the smaller cities."

District of Columbia, p. 121: "Rabies still occupies a prominent position upon the public stage. An almost continuous muzzling order has been in effect, but the hoped for results have not been obtained on account of the flagrant disregard by the police in general, of the enforcement of this order."

Georgia, p. 123: "Hydrophobia: This has increased alarmingly in the last year. The state health board distributes free the Pasteur treatment."

Massachusetts, p. 123: "During the year 1910 there were one hundred and fifty-four cases of rabies reported killed or died, a decrease of ninety-nine."

Michigan, p. 126: "On the optimistic side I am glad to say that so far as can be learned, Michigan is comparatively free from any serious contagious diseases. A few reports of *rabies*, *glanders* and *hog cholera* though not prevalent."

New York, p. 133: "New York has suffered during the past two or three years from a severe epizootic of rabies, but its progress has been noticeably checked by quarantining known infected areas and muzzling or confining dogs in such localities, in addition to the capture and destruction of such canines as are running loose and unmuzzled in violation of the law. Rabies at different periods during the past two years has appeared in twenty-nine counties in this state, one hundred and three townships, fifteen cities and eight villages."

Oregon, p. 139: "An epidemic of rabies prevailed in the Wallowa Valley, in a rather isolated section in the northeastern part of the state. No known fatalities occurred among the inhabitants although a number were bitten by rabid animals and received the Pasteur treatment. In most cases where animals were submitted for examination by the state bacteriologist the negri bodies were readily discernible. Coyotes became affected and menaced the entire live stock industry of that district. Sheep and small animals became affected to no slight extent, several thousand animals were exposed, radical measures were instituted and the disease was soon under control although danger still lurks in the presence of the infected roving coyote."

Pennsylvania, p. 143: "Rabies has been entirely too prevalent in this state. Twelve districts have been quarantined, affecting 2,746 animals. Those destroyed numbered 1,101 and 212 persons were reported as having been bitten. At the laboratory of the

state live stock sanitary board five hundred and twenty-seven head of animals were received during 1910, suspected of rabies. Of these four hundred and eight were from dogs, and *three hundred and thirty-five proved to be positive*. The brains of six cats, five horses, six hogs, three human beings, one mule, one sheep, one deer and one goat were examined, with positive results in fifteen out of the twenty-four cases. During the years 1905 to 1909 inclusive, the brains of seven hundred and thirty-one animals were examined with positive results in five hundred and fifty-six cases. These figures do not include any experimental animals."

Vermont, p. 153: "No cases of rabies have ever been reported in Vermont."

Wisconsin, p. 155: "Rabies:—There was a marked increase in the number of cases reported during the last year."

Wyoming, p. 156: "An outbreak of rabies occurred in the vicinity of Cheyenne during which two persons were bitten by rabid dogs, but prompt submission to the Pasteur treatment prevented any loss of life. Laboratory examination of suspected cases demonstrated the existence of the disease, which, followed by a city muzzling ordinance checked any further occurrence."

United States in General, p. 163: "Rabies continues to spread and is now found in nearly every part of the United States. In some localities it is suppressed by effective muzzling ordinances with destruction of all unmuzzled dogs found on the highways. The disease has not been so prevalent in most of the states in the western third of the United States as during the year previous but in the central states the condition has been more serious.

"There is a laboratory in Kansas City in which anti-rabic vaccine is prepared and sent out, not only for the purpose of vaccinating against rabies in persons, but also in animals. The price for the course of the treatment in persons is fifty dollars and in animals twenty-five dollars. A dose is sent each day. This laboratory is in charge of Dr. V. Nisbet. There may be other laboratories doing the same."

Canada, p. 164: "A few cases of rabies have existed in south-western Ontario during the past six months but the disease may be considered under control. No cases have appeared in other sections of Canada."

In regard to the intra-dermal method of tuberculin testing the following is quoted from the report of the Committee on Diseases:

"Dr. D. F. Luckey, state veterinarian of Missouri, is giving the intra-dermal test in cattle a practical test in his state work. The following is an abstract from a recent letter which I give with his permission: 'We begun the use of the intradermal test January last. We attempted to verify the results with subcutaneous test and further by post-mortem examinations. We had occasion to give this test a severe trial around Columbia and I am glad to report that it appears to be a decided success, especially, during the summer months. I believe the intra-dermal test will

prove more reliable than the subcutaneous tests. We have not hesitated to condemn cattle upon this test alone. Its accuracy depends largely upon the care in making the injection. We found that unless extreme care was used, the injection would not be properly made. In any animal with a bad history we injected both caudal folds. Age, pregnancy, recent parturition, excitement and weather conditions seemed to cut no figure with the test. Using it the veterinarian can do his work in daylight and does not have to wade about in filthy barns during the night. In making the tests around Columbia our men would ride all day, stop at different places, making the injections, and tagging the cattle. Anywhere from forty-eight hours to four or five days thereafter (usually on the second day) a re-examination of the same cattle is made with a view to recording the results of the injections. A little swelling sometimes follows from the insertion of the needle, but usually disappeared by the end of forty-eight hours. The swelling as a result of tuberculin reaction is usually well marked by that time and persists for about a week. As far as our observations have gone, there is a little uneasiness and switching of the tail noticed in tuberculous animals, beginning a few hours after the injection. There is exfoliation of the epithelium as the reaction disappears.'"

From the January number of the American Veterinary Review it appears that the Chief of the Bureau of Animal Industry has carried out the promised experiments with the intra-dermal test, as follows:

"The morning following * * * held in store for the visiting veterinarians * * * the inspection at the stock yards of about 140 head of cattle that had previously been tested under the direction of Dr. Mohler with the ophthalmic and intra-dermal methods,—a golden opportunity for studying the relative value of the two tests in question, and also their relative value as compared with the present (subcutaneous) tuberculin test." Unfortunately the results are not given in this number, but I have communicated with Dr. Mohler and asked for an advance copy of the report on the subject. Another paper, entitled, "The Newer Methods of Tuberculin Testing," by Dr. K. F. Meyer, director of the Pennsylvania Live Stock Sanitary Laboratory, has also been sent for.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

FORESTRY AT THE SUGAR PLANTERS' MEETING.

At the annual meeting of the Hawaiian Sugar Planters' Association, held in Honolulu, December 4 to 7, 1911, more than usual attention was paid to the subject of forestry. On December 5, the chairman of the Committee on Forestry, Mr. Albert Horner, of Kukaiau, Hawaii, presented a report calling on the Association to take definite action in forest matters and recommending that certain specific projects be given the moral and financial support of the Association. These recommendations were later embodied in a resolution, which was unanimously adopted.

Mr. Ralph S. Hosmer, Territorial Forester, also addressed the meeting, emphasizing further the points brought out in Mr. Horner's report. As usual the report of the Committee on Forestry was distributed in printed form at the time of the meeting. Following are the remarks of Mr. Hosmer and the resolution adopted by the Association:

Members of the Hawaiian Sugar Planters' Association.

Mr. President and Gentlemen:—Arguments in favor of forestry and statements of reasons why such work ought to be done in Hawaii have been made so often before this Association that the subject is one familiar to you all. I do not come here today to re-thrash the old straw. But there are certain things that for the good of the Territory must continue to be said until the public sentiment that unquestionably exists here is crystalized into definite and positive action.

No speakers could ask for a more appreciative audience than is this association but, gentlemen, what is needed now is no longer mere polite attention and the formal approval of recommendations. It is high time that every plantation here represented should, in the terms of the street, "get busy" with forest work, and that at once.

The sole reason why this demand can be made here is that such work will pay. The plantation companies are long term corporations. They should and can afford to look well into the future. By the practise of forestry they will benefit themselves in many particulars.

This whole matter is purely a business proposition. The only excuse for the existence of forestry at all is that it is good business to use part of the land for raising trees. That it is good business so to do is proved by the experience of many nations, ancient and modern, so that indeed the degree to which forestry is practised has become a sort of yard stick by which the relative advancement of nations can be measured.

Here in Hawaii as elsewhere, wood and water are at the foundation of all our prosperity. We have given much attention of late to the right use of water, and properly so. Mr. Martin, the hydrographer, by dropping his current meter into your ditches

has given some of you figures that have set you thinking as to how to stop the leaks. But gentlemen, if you do not take adequate care of the forests that cover your water sheds it will take a very much more complex instrument than a current meter to record the alternate periods of flood and drought that in time are bound to follow the opening up of the protective cover.

Some plantations are of course already doing much in the way of forestry: others might very well do more. Especially ought there to be more and better coöperation between the plantations and the government in the protection of the native forests. It may be replied that it is the duty of the government to protect the forests. So it is. But here at once comes in the question of money, for the government cannot do work without funds any more than can the individual, and up to this time funds in adequate measure have not been provided for forest work.

A possible solution of this difficulty lies, I think, in the proposal that has recently again been brought forward, that the money now received from water revenues from forest reserves be used by the Government for forest work, instead of as at present going into the Territorial Treasury as a part of the general receipts of the Land Office. By turning this money that comes from the forest, back into the forest, the foundations can be laid of a self-supporting, revenue-producing forest system that in time will be one of the most important assets of the Territory. I urge upon the members of this Association that they use their influence to have brought about this adjustment of revenues.

If anyone wants to be primed with an argument, the reasons for this request are these: the continuance of the native forests on the water sheds in *good condition*, is essential to the maintenance of the local water supply. Our forests when exposed to grazing and trespass quickly become unhealthy and subject to destruction by insects and disease. The remedy is to maintain the forests in their original condition, or where it is necessary, to bring them back to that state. Essentially this means fencing and the removal of all live stock, followed where this may be required by the planting of blanks and open areas. This is work in which the Government and the plantation should coöperate, because on the right use of our waters, lands and forests, depends the prosperity of these Islands.

The second main need in forestry in Hawaii is tree planting on waste land. This is especially and immediately important on the sugar plantations because of the increasing cost of fuel, not to speak of other wood supplies. In view of what has been said so many times in former years, it is not necessary before this Association to enlarge on the advantage of having on each plantation groves of trees as a local source of wood supply. I desire merely to remind you that the offers of the Board of Agriculture and Forestry are still open: (1) to furnish advice as to what, where and how to plant, and (2) to supply at cost price seed-

lings of forest trees in quantity, ready for transplanting. By this method the plantations which for any reason prefer not to maintain forest nurseries of their own, are relieved of the trouble of getting the seedlings started, and also of much of the danger of loss, for the little trees, here offered, are not sent out from Honolulu until the danger from the "damping-off fungus" is past. As the Division of Forestry is decidedly limited in its equipment, it is advisable that orders for trees be placed some months in advance, otherwise it may not be able to supply the seedlings at the date required. It takes about six weeks to get eucalypts ready; two months for ironwood. The seedlings are sent out in boxes holding from 800-1000 each. The price per box, f. o. b. the wharf at Honolulu, is \$1.00 per thousand.

It is a very encouraging sign that during the past year tree planting has received a decided impetus in Hawaii, especially in the way of shelter belts for exposed cane fields and in groves for the production of fuel wood. But it is only a small part of what yearly ought to be done until enough forest plantations have been started to yield annually as much wood as is used on the several plantations.

Tree planting is a good investment—one of which the returns can be measured directly in dollars and cents. One of the best things about tree planting is that in this way there can be utilized land fit for no other purpose. For wind breaks near the sea ironwood has shown itself the tree to be used. For quick returns in fuel and wood production one of the eucalypts is usually the species to be recommended. In this connection I would remind the members of this Association that a few months since the Division of Forestry issued a bulletin on *Eucalyptus Culture* in Hawaii by Mr. Louis Margolin of the U. S. Forest Service, Mr. Margolin having been detailed to Hawaii upon special request to assist in this study. The bulletin is based on a careful investigation of all the available sources of information about eucalyptus in Hawaii. The Division of Forestry will be glad to send copies to anyone upon application. It will repay all plantation men to give this report careful reading.

In Hawaii it is impossible for anyone who has to do with the management of affairs not to be concerned with what has come to be termed The Conservation Program—the right use of lands, waters and forests. But as the whole conservation movement grew out of forestry, which must always remain one of its most important parts, so locally there is at the present time no way in which Conservation can be practised better than through forest work. My final word is that for the sugar plantation companies this means protecting the native forests and planting trees.

RESOLUTION ADOPTED BY THE HAWAIIAN SUGAR PLANTERS' ASSOCIATION AT ITS MEETING DECEMBER 6, 1911.

Whereas the subject of forestry is one of the most important

with which the sugar planters of Hawaii have to deal, because (1) of the close relation between forests and water supply and (2) of the constantly increasing need for local supplies of fuel and other wood, and

Whereas what is needed now is no longer mere approval but definite action, therefore, be it

Resolved, that it is the sense of the Hawaiian Sugar Planters' Association that the Trustees be requested to take definite and if possible favorable action, through a special committee or otherwise, on the recommendations contained in the report of the Committee on Forestry for 1911, to-wit:

(1) That there be introduced into Hawaii insect eating birds, such as shall have been approved by competent authorities as being beneficial.

(2) That financial assistance in the way of providing additional equipment be given by the Association to the Territorial Division of Forestry for its work of growing tree seedlings in large numbers for the use of those, especially sugar plantation companies, doing extensive forest planting.

(3) That it be brought forcibly to the attention of each plantation that it is the judgment of this Association that for their own interest and strictly from a business standpoint, the individual plantations ought to pay greater attention to tree planting and also to protecting the native forest by fencing in the areas from which the plantation draws its water supply.

Resolved Further, that this Association approves the adoption by the Territory as its definite policy, of the suggestion that as far as practicable the revenues derived by the Government from leases or licenses of waters flowing from the forest reserves be used for forest work; and that the Trustees be requested so to recommend to the appropriate Territorial officials.

FICUS STIPULATA.

(From Tropical Agriculturist.)

Ficus stipulata, better known horticulturally as *F. repens* (sometimes called "Mauritius Ivy"), is perhaps the best substitute we have in the tropics for the English ivy, which forms so delightful an adornment to gardens and country houses in Europe and other cool countries. In the tropics, where the ivy does not flourish, the want of a good wall creeper is often felt. Few walls, either of bungalows, estate buildings, churches, etc., which would not be greatly improved in appearance by the growth of a suitable creeper. This want is suitably supplied by the plant *Ficus repens*, as may be seen in the accompanying illustration, better perhaps than by any other tropical plant known. The plant thrives equally well at all elevations, from sea level to 6000 feet,—an uncommon quality which specially commends it to favor. It is

easily propagated from small cuttings of the rooting stems, and these have only to be inserted in ordinary light soil where they are intended to grow permanently. This should be done in wet weather, otherwise the cuttings must be kept shaded and watered frequently until they strike root, which may be known by the appearance of fresh growth. In a short time it spreads over the available surface, and it may be said to be seen at its best just before it completely covers the wall. Afterward it should be occasionally trimmed with a hedge shears, clipping off any straggling ends of branches, etc.

This plant is remarkable from the fact that although a perfect creeper, it belongs to a genus which is usually characterized by large trees or shrubs. Familiar examples of the family are the fig (*Ficus carica*), the Banyan, and the Rambong rubber trees—*Ficus bengalensis* and *Ficus elastica*, respectively.

Ficus repens occasionally bears an abundance of fig-like hard green fruits, which are not edible. The plant is considered to be a native of China and Japan, but is very similar to, if not identical with, *Ficus Thwaitesii* of Ceylon.

H. F. MACMILLAN.

NOTES ON SOME HONOLULU PALMS.—II.

VAUGHAN MACCAUGHEY—The College of Hawaii.

The Palmettos—Sabal.

There are seven groups of genera of palms indigenous to the continental United States, comprising ten species. Of these seven genera, the most widely known are,—the Silver Palms (*Thrinax*), the California Palms (*Washingtonia*), the Royal Palms (*Roystonea*), and the Palmettos (*Sabal*).

The name "palmetto" is of Spanish origin, being a modification of the word *palmito*, which is diminutive of *palma*, and means "a little palm." A number of the Sabals are quite small, with stems hidden below the soil, and to these the name may appropriately be applied. Any name, however, which is indicative of small stature, can scarcely be applied to the whole genus, for the best known species attain considerable size, having trunks several feet in diameter and thirty to sixty feet in height. Although unsuitable, the name palmetto is widely used, and will doubtless persist. The origin of the name Sabal is not fully known; it may possibly be one of the native names for the palmettos in South America.

The palmettos were originally confined strictly to the Ameri-



Fig. 1.
PALMETTO—Yard of W. E. Rowell. (Note arrangement of leaf bases).



Fig. 2.
PALMETTO—Government Nurseries.

PHOTO BY ROCK

cas, and were unknown to any part of the Old World. They were distributed naturally from the Bermuda Islands and the South Atlantic and Gulf States of North America through the West Indies to Venezuela and Mexico. It is of interest to know that the Cabbage Palmetto is the northernmost species of all the palms. The Sabals are now planted as ornamentals throughout many tropic and sub-tropic countries. Several kinds have been planted in Honolulu, and though not rare, they are by no means as common as some of the other palms.

The palmettos that are chiefly used for ornamental plantings are,—the Dwarf Palmetto (*Sabal Adansonii*), *S. mauritiaforme*; the Cabbage Palmetto (*S. Palmetto*); Blackburn's Palmetto (*S. Blackburnianum*); the Mexican Palmetto (*S. Mexicanum*). The second and third of these have been most commonly planted in the Honolulu region. These five species may be distinguished by means of the following key, which has been adapted from Bailey's Cyclopedia of American Horticulture,—

- A. Leaf-blade longer than petiole.
 - B. Trunk none, the rosette of leaves springing directly from the ground.....*S. Adansonii*
 - BB. Trunk of considerable height, finally attaining 60 feet*S. mauritiaforme*
- AA. Leaf-blade shorter than petiole.
 - B. Leaf-blade heart-shaped in outline.....*S. Palmetto*
 - BB. Leaf-blade orbicular in outline.
 - C. Divisions of leaf rather rigid. *S. Blackburnianum*
 - CC. Divisions of leaf pendant.....*S. Mexicanum*

The notes that follow relate chiefly to the Cabbage Palmetto, but in many respects apply to the palmettos in general.

As was indicated in the discussion of the name "palmetto," there are two distinct types of Sabal,—(1) small, "stemless" species whose short trunks are buried in the ground; (2) species with stout, columnar trunks. The kinds planted in Honolulu belong largely to this latter class. The stem is covered with a reddish-brown rind, but this usually entirely hidden by the peculiar and characteristic arrangement of petioles.

The leaves of the petioles, like those of the majority of palms, are tough and leathery, and their stalks or petioles are proportionately hard and woody. These tough petioles are persistent—that is, they do not drop from the trunk as do those, for example, of the Royal Palm. The leaves of the Royal Palm, when they have attained maturity, fall off entirely, leaving a smooth, ring-like scar. The leaves of the palmettos, like those of the date palm, persist for a long time. Finally the dead and withered leaf-blade drops away, leaving the petiole attached to the stem. The broad, concave bases of the petioles are gradually split open by the steady enlargement of the growing stem. This causes a



Fig. 3.
YOUNG PALMETTO--Kecaumoku Street



Fig. 4.

PORTION OF TRUNK OF PALMETTO SHOWING "BASKET WORK."

natural interlacing of the leaf-bases, and gives the trunk the peculiar appearance of being encased in a kind of regular basket-work (see Fig. —). This unique *chevreaux de frise* remains upon the trunk until the latter has attained the height of ten or twenty feet. (See Figs. 1, 3, 4.)

The underground portion of the stem is scarcely less interesting. It consists of a short, pointed, knob-like stem surrounded by a dense mass of contorted roots, this mass often being 4 to 5 feet in diameter and 5 to 6 feet deep. From it tough, light-orange-colored roots, often nearly half an inch in diameter, penetrate the soil for a distance of 15 to 20 feet. According to Seemann, "the roots contain a considerable quantity of tannin."

The wood is light, soft, pale-brown, with numerous hard fibro-vascular bundles. The outer rim is about two inches thick, and is much lighter and softer than the interior. The inner pithy portion of young trees is starchy and edible. In the Southern States the trunks are used, because of their great durability for wharf-piles. Polished cross-sections of the stem sometimes serve for the tops of small tables. The wood is largely manufactured into canes. Pieces of the spongy bark and stem are sometimes used as a substitute for scrubbing brushes.

Palms may be grouped in two classes, dependent upon the shape of the leaf,—feather-shaped or pinnate, including the date palm, royal palm, wine palm, and others; fan-shaped or palmate, including the silver palm, Hawaiian palms, and others. The palmettos belong to this latter group. The stout stem is surmounted by a crown of fan-shaped spreading leaves (see Figs. 1, 2). They are at first upright, then spreading nearly at right angles with the stem, and finally pendulous. The leaves are dark, lustrous green in color, and tough and leathery in texture. The blade is 5 to 6 feet long and 7 to 8 feet broad. It is divided into many narrow, long-pointed, parted segments or lobes. Each segment is folded at the base. The margins of these segments are often fringed with long threads. The midrib extends nearly to the center of the leaf. The petiole is 6 to 7 feet long, and has at its base a shining, chestnut-brown sheath of strong fibers (see Fig. 5).

The Cabbage Palmetto grows, as do all palms, from a large central, terminal bud. This bud is the "cabbage" of the palm, and because of its succulence and tenderness is cooked and eaten as a vegetable. The removal of this growing point of course kills the tree. Coarse hats, mats, and baskets are made from the light-colored immature leaves. From the sheaths of young leaves are obtained the bristles for certain kinds of scrubbing brushes (see Fig. 3). The mature leaves are sometimes used as thatch.

The flowering branches emerge from among the leaves. They are 2 to 2½ feet long, with many slender, incurved branches. These branches are profusely covered with small yellowish or

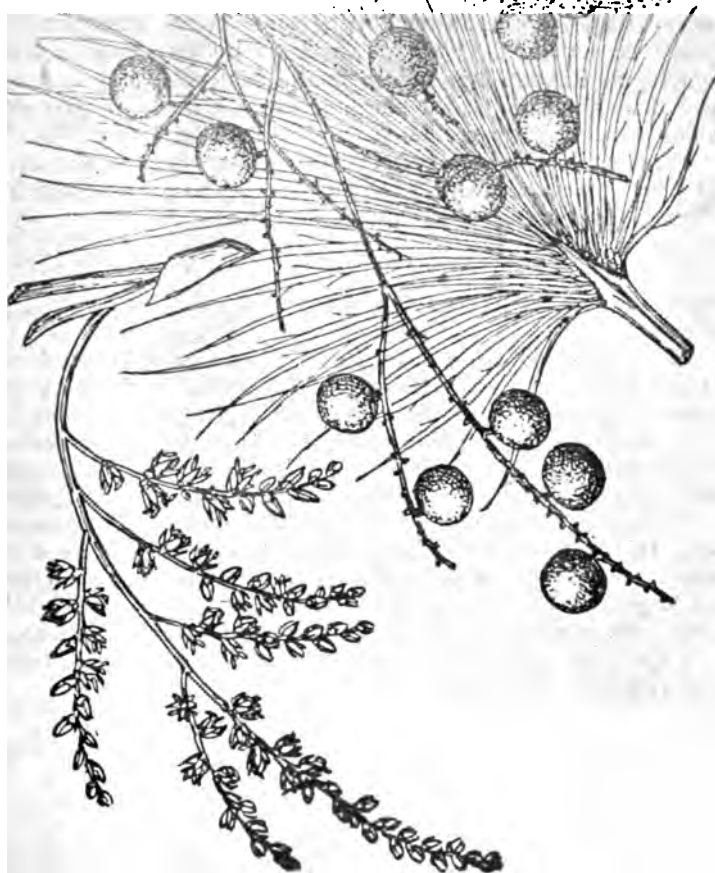


Fig. 5.

LEAF, FLOWERS AND FRUITS OF CABBAGE PALMETTO. (From Sargent's "Manual of the Trees of North America.")

greenish flowers. The fruit is a small, round, black, short-stemmed berry, about one-third of an inch in diameter. The flesh is thin, sweet, and dry; in its center is a single light-brown seed, about one-fourth inch broad (see Fig. 5).

In Florida, according to Rogers, "palmetto scrub is the bane of hunters, surveyors, and others who are obliged to go on foot through regions covered with the tough young growth of these trees."

Concerning the proper treatment of the palmetto, Mr. H. Nehrling, an authority on this group, writes in the *Cyclopedia of American Horticulture* as follows: "All the species that form trunks are objects of great beauty when well-grown. They need to be well fertilized, or the lower leaves will suffer and finally die, thus detracting much from the elegance of the specimen. They all grow naturally in rich black soil * * * they can hardly be fertilized too much, and the more nitrogeneous manure and water they get the faster they grow. When transplanted they must be set deep. * * * Make a hollow about 6 feet in diameter and about 2 feet deep in the center."

The Sabals are suitable for planting as individuals, in groups, and along small roadways. Their small stature and slow growth makes them unsuitable for ordinary street planting. These palms should have a more extended recognition by those interested in ornamental planting in Honolulu and Hawaii.

DUBOIS ON RUBBER.

James T. DuBois, recently United States Consul-General at Singapore and at present Minister to Colombia, is enthusiastic over the Philippine Islands as a future field for rubber production. A recent interview published in the *New York Sun* credits him with stating that the Philippine Islands south of the tenth parallel are as well suited to rubber culture as the Malay Peninsula. "I believe it the best in the world for the cultivation of rubber. In two months nearly a million rubber seeds were sent from our consulate to the Philippines, and in my opinion someday rubber is going to be one of the greatest assets of the islands." The big rubber territory of the Philippines covers Mindanao, Basilan, the Taw-Tawi group, Palawan, and Jolo, the home of the Sultan of Sulu.—*Mindanao (P. I.) Herald*.

BY AUTHORITY.

RULE XIII.

**RULE AND REGULATION OF THE BOARD OF COMMISSIONERS
OF AGRICULTURE AND FORESTRY CONCERNING THE CON-
TROL OF THE PLANT PEST THIMBLEBERRY IN THE TER-
RITORY OF HAWAII.**

The Board of Commissioners of Agriculture and Forestry hereby make the following rule and regulation:

SECTION 1. For the purpose of controlling and as far as possible of preventing the further spread of Thimbleberry (*Rubus jamaicensis*), called also Olaa Raspberry, and Hitchcock Berry, a plant introduced into this Territory at a point near Hilo, Hawaii, and now known to be established on various parts of the Island of Hawaii and in the Koolau and Hana Districts, Maui, which by reason of its habits of growth and ease of propagation has become in certain parts of the Territory a serious pest, especially on grazing land, all persons and corporations are hereby prohibited from carrying or shipping any plant, root, cutting, fruit or seed of the said Thimbleberry from one Island of the Territory to any other Island; *Provided, however*, that shipments of such Thimbleberry plants which are infected with a fungus disease may be made by duly authorized agents of the Board of Agriculture and Forestry for the purpose of inoculating healthy Thimbleberry plants with said disease.

SECTION 2. For the purpose of eradicating and preventing the spread of the *Rubus jamaicensis*, inspectors and other duly appointed agents of the Board of Agriculture and Forestry are hereby empowered to enter at all reasonable times any and all premises throughout the Territory where the Thimbleberry is known or believed to be growing, and such agents are also hereby empowered, if plants of Thimbleberry are found thereon, to seize and remove the same and to have them destroyed.

SECTION 3. Any person or corporation violating the above rule shall be guilty of a misdemeanor, and shall be punished by a fine not to exceed Five Hundred Dollars, as provided by Section 390 of the Revised Laws of Hawaii as amended by Act 82 of the Session Laws of 1905, and Act 112 of the Session Laws of 1907.

SECTION 4. This regulation shall take effect from and after the approval thereof by the Governor.

APPROVED:

W. F. FREAR,
Governor of Hawaii.

Honolulu, Territory of Hawaii,
January 31, 1912.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHRLHORN,
Superintendent.

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Another article of Professor McCaughey's series on Honolulu palms appears in this number.

Mr. Swezey's paper on insect parasitism, begun in this number, is interesting as well as instructive.

There is not a more interesting and important problem, if the subjugation of animal and plant distempers be excepted, pending in the Board of Agriculture and Forestry than that of the reclamation of Kahoolawe. Not only for the intrinsic profit of making the little island industrially productive, adding so much more to the limited area of arable land in the Territory, is the matter attractive, but the lessons of economical reclaiming and conserving that, with comparative cheapness and positive absence of appreciable risk of anything, may be learned from the experimentation necessary to the task will undoubtedly be of inestimable value in dealing with reclamation projects elsewhere in these islands. Mr. Hosmer's proposals in the matter in this number will be read with general interest.

Mr. Adams' plea for a secondary agricultural school is reprinted in this number from a daily newspaper. It is worthy both of study and preservation. The projected school of this character at Kahuku ought to be only the first of several in this Territory—one at least for each island being the minimum to work toward. There are two or three public and private schools in Hawaii which have for years been developing on the lines proposed, which bid far to attain to the standard contemplated for the Kahuku farm school. From all reports, in official periodicals and the news press, the Philippine Islands are forging ahead in agricultural instruction combined with other education, not only faster than Hawaii but bidding fair to establish models worth noticing by many states in the mother country. Teachers can not fail to be greatly helped in bending the pliant twig of youthful aspirations for life and livelihood on and from the soil by fully absorbing the sentiments and suggestions of Mr. Adams.

It is gratifying to note a fresh triumph of the new policy of marketing superintendency under the direction of Mr. Starrett. This is the development of an enthusiastic and productive interest in the growing of the Bermuda onion on the Island of Kauai. Some samples of the bulbs exhibited in town were a revelation to those seeing them. While the plans were all laid for making the Kauai output a new article of export to San Francisco for the off season in California, local dealers rose in arms so to speak and put a price on the onions for the local market which could not be rejected. So, while the home consumption keeps up with the supply, the growers are saved the ocean freight and all other attendant export risks upon their product.

Contributors, of whom the number is increasing in gratifying manner, may be implored to limit the length of their papers for this magazine. Its pages are restricted in number to fit the cost appropriation, and anyhow an article running beyond three or four pages must be interesting indeed not to be tedious to the average reader. It should also be known that the official matter, including that semi-officially requested insertion, nearly every month requires a large proportion of the available space. Since, too, the cause of agriculture in the schools has had the Forester made its organ, a problem of every month put up to the editor to solve is the due apportionment of space to the various subjects now germane to these pages. With the assistance of the president of the Board of Agriculture, however, it is hoped to effect a proper balance of all things before long. The growing importance of the Forester and Agriculturist, resulting from its widened scope, makes the necessity of its enlargement appear imminent. In the meantime the faculty of condensation should be exercised by all its contributors.

ROSELLE.

The roselle (*Hibiscus subdariffa*) which was introduced and distributed to a limited extent this spring by the Bureau, is making a most satisfactory growth at the experiment stations, and a good yield of fruit and seed for future distribution is expected.

The roselle is an annual related to the cotton and okra, and is probably the only plant in the world whose calyces are utilized for food. The plant flowers in October and the rapidly developing fleshy calyces are picked and used in making sauces, jellies, or jams, very similar in flavor to those made from the cranberry. A good wine is also made from the calyces. A very agreeable cooling drink may be made from the leaves and tender twigs, steeped in boiling water. In India the roselle is grown principally for its fiber.

The many useful qualities of the roselle and the ease with which it may be cultivated are sure to make it a favorite among all asses as soon as it becomes known in the Philippines.—*Philippine Agricultural Review*.

NOTES ON SOME HONOLULU PALMS—III.

VAUGHAN MACCAUGHEY—The College of Hawaii.

The Slender Fan-Palms—Thrinax.

Thrinax is a Greek word for fan. The palms of this genus are characterized by their fan-shaped leaves and slender trunks.

There are nine or ten species of *Thrinax*, all confined naturally to the tropics of the New World. They are distributed from Southern Florida through the West Indies to the shores of Central America. They are now used as pot-plants and ornamentals in many parts of the world. The species that is common in the Honolulu region is the *Thrinax argentea*. Those grown in pots or tubs are young or stunted plants, and have little or no stem; those grown out of doors in the ground attain mature stature, with tall, slender trunks (see fig. 2).

The *Thrinaxes* are small palms, rarely over 15 to 20 feet in height. In the cultivated species there is but a single stem to a plant, the others either not developing or being pruned away. In the case of several of the wild forms, however, the palm sends up from the ground a number of stems, forming a clump or group. The lower portion of the trunk is marked by the ring-like scars left by the falling leaves; the upper portion is more or less clothed by the fringed leaf-sheaths. The rind, or outer layer of the stem is pale gray, almost as light in color as the rind of the royal palm. The wood is light and soft, with numerous small fibro-vascular bundles. The exterior of the stem is much harder than the spongy interior. According to Sargent, in the Southern States "the stems are used for the piles of small wharves and turtle crawls" (traps).

The leaves of *Thrinax* form a loose, graceful crown at the summit of the slender stem. The leaf-blade is orbicular. It is thick and firm in texture and is conspicuously folded or plaited, like a fan. The plaits or segments are separated near their ends, and the ends themselves are forked or split. The rind is either quite short or entirely lacking. At the center of the upper surface of the blade, above the point where the petiole is attached, is the conspicuous, elevated, concave ligule. While young it is lined with a silvery wool. This conical, pointed ligule is one of the characteristics of the *Thrinaxes*, distinguishing them from other palms.

The petioles are long, slender, and arched by the weight of the blade. In cross section a petiole is biconvex, and its margins are smooth. The leaves of palms are characterized by the peculiar and interesting sheaths that encompass the bases of the petioles. These sheaths are composed of stout, interlacing fibers, which form a coarse fabric-like material, and indeed are utilized as such by many semi-civilized peoples. The sheaths of the



FIG. 1.

Palmettos have been described in a preceding article. Those of the *Thrinaxes* are bright mahogany red in color, and are covered with a thick, silvery wool, which masks the true color of the slender, matted fibers (see fig. 1). The sheaths are relatively large, and clasp the stem instead of hanging loose like those of the cocoanut.



FIG. 2.

The characteristics of the leaves of the various *Thrinaxes* may be used to identify them. The following key is given by Mr. Jared G. Smith, now of Kona, Hawaii, in Bailey's *Cyclopedia of American Horticulture*. Mr. Smith has made an exhaustive and technical study of the palms, and his articles have been the source of much of the data given in this non-technical series. Mr. Smith's key to the ornamental species of *Thrinax* has been slightly modified.

- A. Under surface of leaves green.
 - B. Ligule with a blunt appendage at the middle. *Thrinax radiata.*
 - B.B. Ligule bluntly triangular. *T. Parvifolia.*
 - B.B.B. Ligule inconspicuous, truncate. *T. Barbadosensis.*
- A.A. Under surface of leaves silvery.
 - B. Leaf segments joined together at bases. *T. argentea.*
 - B.B. Leaf segments joined together for about one-third their length. *T. excelsa.*
 - B.B.B. Leaf segments joined together for about one-half their length. *T. multiflora.*

The flowering branches arise from among the leaf bases. They are long and slender, with numerous branchlets. The main axis of a flowering branch is clothed with thin, papery, tubular sheaths, split open along one side. The flowers themselves are small and are not brightly colored. The fruit is spherical, about the size of a pea, with a dark skin and juicy, bitter white flesh. The single central seed is thin shelled and brownish. Honolulu trees are commonly in fruit during April and May, the fruiting branches resembling gigantic clusters of small grapes (see figs. 1 and 2).

The Thrinaxes are widely used as pot or tub plants, and less commonly planted in the open. They grow somewhat slowly, but demand little care. Their graceful appearance and easy culture has given their great popularity, and *Thrinax argentea* is one of the more common of the small palms in the Honolulu region.

SUGAR, TEA AND COFFEE.

Some government statistics which have appeared recently throw light upon British tastes, and the extraordinary capacity of British stomachs in certain directions. Thus the amount of sugar we eat in one form or another is astounding. We import more than one-tenth of the world's production, which was estimated at 15,250,000 tons in 1910. Of the total product, more than half (8,600,000 tons) was cane sugar, and the rest beet. Of beet sugar, Germany produced 2,000,000 tons last year, and it is the semi-failure of the German crop that is mainly responsible for the sharp rise in prices. How serious this rise has been I may illustrate from the fact that it costs a laborer with sixteen shillings a week and a large family an additional sixpence a week. With sugar we naturally associate tea, and here again our consumption is enormous, amounting in 1910 to nearly 287,000,000 pounds. But why is coffee (the national drink of the United States) of so little account here? Our consumption of coffee last year was only just over 29,000,000 pounds, about one-tenth that of tea.—*Lucellum.*

RECENT INVESTIGATIONS IN INSECT PARASITISM.

 BY OTTO H. SWEZEY.

(A paper read before the Agricultural Seminar, College of Hawaii, February 15, 1912.)

Insects as parasites have been known since the remotest times of human history. That insects, themselves, were parasitized by other insects was demonstrated in the later centuries, when close attention began to be given to biological studies. This gave rise to the familiar rhyme: "The little fleas which do us tease, have other fleas to bite 'em; and these in turn have littler ones, and so ad infinitum." Though not true of the flea, this idea is exemplified in many groups of insects that have been exhaustively studied in quite recent years.

At the first, let us ask, "What is meant by insect parasitism?" Parasitism has been defined as an association of two different animals, one, the parasite, living at the expense of the other, the host. Many of the parasites with which we are familiar do not kill the host outright, but live along with the latter continually, often for long periods of time, or acting only as an annoyance for shorter periods of time; as, for example, lice and fleas on our domestic animals.

On the other hand, when one insect parasitizes another insect, it usually results in the death of the host; as, for example, the Tachinid fly, which lays its eggs upon army worms and other caterpillars. When the egg hatches, the young maggot penetrates the body of the caterpillar, there living and growing by feeding on the juices and fat of the host, not attacking the vital organs till the young parasite nearly reaches its full growth. It finally does destroy sufficient of the vital organs as to result in the death of the caterpillar, which has all along been supplying the nutriment for its growth; then leaving the dead corpse of its host, enters the ground to finish its transformation to the adult stage.

A predaceous insect also causes the death of the insect on which it feeds, but it is a more sudden process; as, for example, when a ladybird beetle eats a plant-louse, it is a momentary affair. This illustrates the difference between insects that are parasites and those that are predators. However, the line between the two classes cannot be very accurately drawn. To illustrate: When the little Braconid fly stings and paralyzes a palm leaf-roller caterpillar, lays its eggs on the surface of the caterpillar, and these hatch and feed externally on the paralyzed caterpillar, in two or three days completing their growth, then spinning their silken cocoons on the leaf nearby, from which the adult insects emerge in about a week, we call this insect a parasite. But when

a certain black wasp catches these same caterpillars from the palm leaves, stings each one to paralyze it, and stores up half a dozen of them in a cell of its nest in which an egg has already been deposited, and the larva hatching from this egg eats all the caterpillars in a few days, we do not call the wasp a parasite; but speak of it as preying upon caterpillars. In each case, however, the caterpillar which is the victim is stung and paralyzed so that it remains in a living though inactive condition, until being eaten. In the case of the Braconid parasite, from one to twenty larvae occupy about three to four days in eating one caterpillar; while in the case of the wasp, its larva eats one or more per day of the paralyzed caterpillars stored in the cell for it. Apparently if one is a parasite, the other should be considered a parasite also. Neither of these quite answers to the condition of the definition of parasitism with which we started: that the host and parasite are *living* together, the latter at the expense of the former.

Among insects, parasitism is carried on in so many different ways that a general definition would have to be modified to fit many of the cases. This diversity is partially due to the transformations that insects pass through from the egg to maturity. Not so with all, but in general, from the egg hatches a larva, which may be a grub, maggot, caterpillar, etc., which eats and grows until attaining its normal size, then changes to the pupa stage, which is a quiescent stage externally, but very active internally, as many changes of structure take place, resulting in the formation of the adult insect, which emerges from the pupa in due time.

Now about insects, there are certain families and groups that are always parasites on other insects. Some of them are parasitic in eggs of other insects; some are parasitic on the larvae; others parasitic on the pupae; and yet others parasitic on adult insects. All, however, resulting in the death of the host, at least in the great majority of cases. All of these are called primary parasites. Now some of these primary parasites may themselves be attacked by parasites, and these in turn may also be parasitized, all of which are called secondary or hyperparasites.

Each parasite has its own method of attacking the host and its own peculiar development; so much so, that there are about as many different methods as there are different species of parasites; but for the more closely related ones the habits are often very similar.

With all this diversity of habits, it is small wonder that the study of insect parasitism is so fascinating and that entomologists of modern times are giving so much attention to it. Many an entomologist has been content to sit in his study or laboratory and write descriptions and classify parasites without giving the least thought to their habits; but to most entomologists nowadays the study of the habits of these parasites is of far more

interest, each one being in a way an unknown problem to be solved; for, unless each one has been studied independently, its host, habits, etc., cannot be definitely known, although they may often be approximately predicted if the habits of those closely related are known. Many insect parasites have been accurately studied, but of the great majority there is yet much to be learned.

Aside from the scientific interest taken in them, their economic importance in keeping insect pests in check has been another reason why so much attention has been given to parasitic insects the past few years. Whenever investigations are made of insect pests, one feature of them is the study of parasites, to determine if there are any in connection with the pest, and if so, how effective they are. If none are found to be present, investigations are made to ascertain whether there may be parasites on the same pest elsewhere which might be secured for use in this particular case. Thus there has been a great deal done in the way of introducing parasites from another country, and even from the opposite side of the world. This has sometimes been accomplished successfully; but has often resulted in failure. There are, however, many important examples of the success of the project, with some of which you are all no doubt familiar.

Among the first of these introductions of beneficial insects from other parts of the world, was the introduction to California of the Australian ladybird beetle which destroys the cottony cushion scale. This was accomplished by Mr. Albert Koebele in 1889, and although ladybirds are not parasites, it is an example of the same class of work. Mr. Koebele did introduce a parasite at the same time, however, but it was the ladybird that was successful and effective against the scale insect.

A familiar instance of successful introduction of parasites is the introduction of egg-parasites for the sugar cane leaf-hopper in Hawaii. These parasites were introduced from Australia in 1904 by Dr. Perkins and Mr. Koebele. The results are too well known to need rehearsing at this time.

A striking example of unsuccessful attempts to introduce effective parasites, is that of Mr. Geo. Compere, who for several years sought many parts of the world for parasites of the Mediterranean fruitfly, to introduce into Western Australia. He finally secured several species of parasites in India, which were successfully introduced into Western Australia, and at first were reported as very satisfactory. More recent reports, however, are that the parasites have not proved effective.

Many more examples could be given of successful introduction of parasites, and unsuccessful attempts as well. Economic entomologists the world over are becoming more and more interested in this aspect of insect parasitism; and numerous are the experiments now going on in the attempt to find and introduce parasites from one part of the world to another to assist in the warfare against insect pests. There is hardly time to treat of all

of them. Probably such work is being carried on at the present time on by far the largest scale in connection with Gipsy Moth and Brown-tail Moth control work in New England. As is well known, the Gipsy Moth has been established nearly half a century in New England, starting from a suburb of Boston and spreading out in all directions, until it is now present in the eastern half of Massachusetts, the northeast corner of Rhode Island, a large portion of southeastern New Hampshire, the southwestern corner of Maine, and a few scattered places in central Massachusetts and in Connecticut. The caterpillars defoliate most kinds of forest, shade and orchard trees and shrubs, and have threatened the destruction of all such in that region. The Brown-tail Moth, another European pest, occupies the same region, and has a somewhat wider range of distribution. The two together form a very serious menace in that region, and to the whole of the country as well, for they are continually spreading in spite of strenuous efforts to keep them in check.

Six years ago, work was begun on the introduction of the European parasites of these pests. Investigation has shown that they have numerous parasites in their native habitat, and that they are usually kept under control by them. Hence, their introduction to America was started and was already being done on an extensive scale in 1906. Hundreds of boxes of parasite material have been imported each year since then, mostly from Germany, France and Austria, also a considerable from Japan. This material consisted of egg-masses, larvae, and pupae of the Gipsy Moth; and winter webs, larvae, and pupae of the Brown-tail Moth. The handling of such a large quantity of material required a large number of cages, and insectaries, as well as an appropriately equipped laboratory. This was established in 1907, at Melrose Highlands, Mass., a suburb north of Boston.

From all this material, large numbers of parasites bred out, consisting of quite a number of species, and attempts were made to establish them in favorable localities. Some have succeeded well, others fairly, and some have probably failed, though how many will not be known for a certainty till later on. The latest report on the work gives an indication of what can be expected, and it looks very encouraging for some of them.

When studied in their native countries, these moths were found to have parasites attacking them in all the younger stages; one or more attacking the eggs; many species attacking caterpillars; and several attacking the pupae of their hosts. Many of these have been reared at the laboratory; some of them for a number of generations, as well as breeding them out of imported material.

Of the egg-parasites of the Gipsy Moth, one from Japan (*Schedius*), was reared through ten generations in one year in the laboratory, and several hundred thousand liberated; but apparently it failed to become established, or at any rate, not so well as it was at first expected that it would. It bred during the

autumn on gipsy-moth eggs, but failed to survive the rigorous New England winter.

The other egg-parasite of the Gipsy Moth (*Anastatus*) occurs both in Europe and Japan. Many thousands of this parasite were reared from imported material, and colonized in several places. Later investigations of these colonies showed that the parasites had established in most of them, and were dispersing slowly, and that as high as 29 per cent. of gipsy-moth eggs were parasited in some instances. This parasite only attacks the eggs soon after they are deposited and before any embryonic development has taken place. Its life cycle was found to be perfectly correlated with that of the Gipsy Moth, producing one generation per year the same as the moth. The first-mentioned egg-parasite, however, produces several generations per year, and they only attack the eggs after the young caterpillar has become fully formed within the egg, living in and destroying this young caterpillar before it hatches. That is, it is an internal parasite of an unhatched caterpillar. It passes through one generation per month, but apparently does not hibernate in gipsy-moth eggs, and needs another host to carry it through the spring till the gipsy-moth eggs are deposited in mid-summer.

Of the parasites on caterpillars of the Gipsy moth, many have been introduced, both Hymenopterous and Dipterous. Most of the Hymenopterous parasites were not considered important; but one Braconid (*Apanteles*) gave great promise in the ease with which its cocoons could be transported, being successfully carried from Japan in cold storage all the way. Many thousand were received alive, and from the adults emerging from them several colonies were established successfully. The adult of this parasite deposits its eggs (often many) inside a living caterpillar. When the young parasites are full grown, they emerge from the dead or dying caterpillar and spin their white silken cocoons in the immediate vicinity. Although so successfully established at first, yet the later reports are that this parasite can no more be found. They have hopes, however, that it will soon be found abundant; that it may have become widely scattered like some others that they have had, that seemed to be lost for a time on account of being so widely scattered that none could be found until they had increased greatly in numbers.

This species afforded opportunity for extensive investigations on hyperparasites. Thirty or more species of hyperparasites were reared from cocoons of this parasite imported from Japan. In shipments of cocoons of the same parasite from Russia, 20 to 25 species of hyperparasites were reared. After colonies of the parasite had become established, many of their cocoons were collected and these found to be highly parasitized. Eighteen species of American hyperparasites were found to attack this host, which has no doubt been a factor in its disappearance.

(Conclusion next number.)

A PLAN FOR A SECONDARY AGRICULTURAL SCHOOL.

Combining a broad view of education with a concrete idea of Hawaii's needs, Andrew Adams, manager of Kahuku plantation, made a notable address recently to the Territorial Teachers' Association. Mr. Adams was speaking on the plans for the secondary agricultural school at Kahuku, and made a forceful plea for a real trial of its merits. Mr. Adams' paper follows:

The Members of the Territorial Teachers' Association, Ladies and Gentlemen:

You have kindly permitted me to present to you the planters' point of view of the proposed establishment in Hawaii of a Secondary Agricultural School. I am credibly informed that Hawaiian planters are reputed to have evolved into autocrats of a sort. If this be so then it is possible that some of them, or of us rather, might be unwilling to delegate to me the authority to present the views of all. To avoid possible trouble therefore, permit me to slightly alter the title of my paper so as to limit my responsibility to presenting one planter's point of view.

It is entirely possible that some of the views which I shall present to you will be a repetition of the views of the other speakers of the afternoon, with mere changes in the phraseology of expression. Such a repetition will but serve to emphasize the fact that the interests of the teacher and the agriculturist are not incompatible, but, broadly speaking, are identical. Intrusted to each are natural forces susceptible of development into great productivity, always provided there is present in the mind and soul of the pupil and in the soil of the field that subtle constructive element or force so necessary to development.

The "Old-Style."

Familiar to us all is the picture of the old time pedagogue who expressed himself best in what Shakespeare called "three-piled hyperboles, spruce affectation, figures pedantical." Perhaps more familiar to us here is the sight of the old style plantation overseer who happened along from the ships in the harbor to try his hand at cane cultivation. I am speaking of classes, not of individuals. The community has come to insist that only such as have a natural inclination and particular qualifications for the work shall preside at the teacher's desk in the classroom. In the final analysis there is no real place in the fields for the individual who has no real love of it. He is deficient in the larger view.

What has this to do with the establishment in Hawaii of a Secondary Agricultural School? You are teachers and understand the meaning of and appreciate the necessity for the larger view. For in your work and mine, inspiring us to sustained effort for its accomplishment, is the knowledge of that insistent human need of

intelligent, sympathetic guidance towards ultimate happiness and the common weal. Does happiness, then, exist on the sugar plantations of Hawaii? Not necessarily nor solely. Neither is it distinctively urban. There are, however, greater possibilities of its attainment by the large majority in the field than in the office or the workshop, for the very simple reason that, generally speaking, life is more natural in the field than elsewhere. Yet for several generations the drift of population has been citywards.

Figures to Prove.

I quote from figures compiled by Mr. William H. Rossit. The population of the world increased from approximately one billion in 1800 to about one billion and a half in 1900. In France, in that hundred years, a group of specified cities increased in population four hundred per cent. while the rest of the nation, exclusive of these cities, increased little more than 20 per cent. In England the population of the cities in 1801 was 25 per cent. of the whole, while in 1900 it was more than 50 per cent. of the whole. In the United States the population in the cities increased 100 times during the century while the remainder of the country increased only eleven times.

These figures are of great significance. I am not certain that the cause underlying this drift citywards is so much desire for urban residence through the belief that it is more advantageous, as it is the failure of the country to meet the needs of its population. Another significant fact has been revealed by statistical research. A large percentage of urban residents are temperamentally unfit for city life. Education is not responsible for this unfitness, although we hear much in these days of the tendency of modern systems to educate the people away from the soil. The agriculturist has not altogether fulfilled his obligations. He has not helped enough to open up the larger view.

This larger view need not include the ability to properly scan a line of Homer, nor to correctly render kai gar when it appears in the text, although that ability need not in itself prevent a tilling of the soil. It does include, however, the right of the individual to have offered him the kind of education which will stimulate his imagination, train his hand and eye, increase his self-respect and enhance the market value of his labor.

At the Bottom.

Right here is one of the fundamentals of the proposal before us. It is not altogether the negative purpose of giving an agricultural training to only such youths as fail to come up to certain specified requirements in the curriculum. It includes the positive purpose of shaming natural tendencies toward agriculture, of engendering a belief in the dignity of labor in general and of till-

ing the soil in particular. This belief needs no elaborate declaration of my profound faith in it. It is as old as history can record. Many of the old classical writers have left us a heritage of practical every-day advice on farming along with their poetry or the details of their adventurous expeditions. Our good friend Xenophon, for instance, was not always marching up a hill or marching down again on the other side. He was oftener in the fields with his laborers and his horses and cattle, for he was a practical farmer who loved the soil and his work. He has not only told us of the dignity of it, but has left rules for planting and other field operations that are wholly applicable today. Think of Varro, who at eighty years of age wrote a treatise on agriculture that is a standard work in these times. None of them knew the science of agriculture, but they all had a good measure of common sense, and Huxley says that "science is organized common sense."

Plantation Usefulness.

The establishment of a Secondary Agricultural School in connection with a sugar plantation will make it possible for that plantation to increase its usefulness to the community. It is needless to say that the sugar industry is in no sense an eleemosynary institution. If it were, the best development of the Islands would not follow. No community prospers when it or any considerable section of it is coddled by the more influential interests. The proposers of this school ask no gifts or special favors for it. Prosperity is inevitable, however, when each individual member of the community has a means of enjoying his privileges and recognizes his responsibilities. We have not yet reached the state when this recognition is altogether spontaneous. Not all adults possess it. It would be strange indeed if an untutored boy with no experience were able to decide along what lines lay his own best development and through what channels he could best reach the realm of his highest usefulness. It is just here that such a school as it is now proposed to establish can serve its best purpose. Its pupils will be given instruction in what goes to make up the fundamentals of education. They will receive training in intensive agriculture. They will receive pay for their honest labor. In other words, they will immediately take their places as producers in the community and will share in the benefits of that production. An increase in the self-esteem of the individual boy will follow his realization of his own powers and possibilities as a producer. The mantle of the dignity of labor will fall upon him—his own intelligent labor co-operating with the scientific training which he is receiving.

"Back to the Soil."

Perhaps some one will say that I am an optimist, an enthusiast—that if there is all this dignity and inspiration attached to agricultural labor, why is it that the fields are not thickly populated—why are all these abandoned farms in New England? So I am an optimist—without cheerful optimism, what would be our state of mind in these days when there is such a tendency to muckraking and the pursuit of gold and of fashion? So I am an enthusiast. I have cause to be. There is too much evidence of a good percentage of splendid results having come from just such schools as the one which it is now proposed to establish here for me to expect anything less of this. My observation has been that most men have in them a love of the soil which would have held them had they been properly trained before other calls became strong. One reason why the call of the city is so often irresistible is that the untrained, poorly educated tiller of the soil sees before him nothing but long years of ceaseless, wearying toil with few diversions. Labor presents to him no aspect of dignity. He sees in it just plain, every-day hard work of the common or garden sort.

To the youth grounded in scientific agriculture are opened up long vistas of possibilities. One of these is the certain increase in value of his labor commensurate with his increased efficiency. Not the least of these is the positive knowledge that he is the possessor of trained faculties which are instrumental in producing two spears of grain where one grew before. He comprehends the scheme of creation. He has the larger view. No man can deprive him of his knowledge or his efficiency. He is of definite, increasing value to himself and to the community. He has no desire to gain the unnatural procession cityward. He will stay with the soil and prosperity.

How do I know this? Look at Denmark. Fifty years ago its rural districts were so depleted of population and its cities so congested, with the consequent increase in the number of unemployed and in crime that its internal revenues were at an alarmingly low ebb and its municipal police systems had the utmost difficulty in preserving order. A system of scientific agricultural training was instituted on the farms. Today Denmark is called England's dairy. It supplies that country not only with milk and cream and butter but with eggs as well.

Textile Schools.

Look at the textile schools of Austria. "These schools were originally founded for the purpose of reviving special home industries which had become almost extinct," says A. S. Levetus, "and to create superior workmen fully equipped not only in their own

particular lines of work, but also in lines allied to it—to give the pupils some interest in life in the world lying beyond the school. The broad general aim is to train the pupils for practical life and love of work.” Recently the scope of the training has been enlarged. “The moral gain to the pupils of these schools,” says Levetus again, “is infinitely higher than the material gain, for the students are brought into close contact with the world without, and life becomes a bigger thing to them.” The larger view again. What is the practical result? Austria is today noted for the excellence of her textile fabrics and her people stay at home.

Then there is Tuskegee. Mr. John Graham Brooks tells the following story of one effort in that institution. To the professor of agriculture had come a lad whose attempts to meet even the lowest literary requirements of the school had failed. Could he be permitted to sit in the class for farming? Permission was granted. It was months before the instructor ever asked him a question. One day the boy came to the instructor and asked, in a shamefaced way, if the instructor would some time go out to see what he had tried to do. Out of objects that had been broken and thrown to the rubbish heap the boy had constructed a hot-house. From these piles of waste he had picked his glass, boards, roofing, window sash and piping. Empty tomato cans, old pails and abandoned lamps served him for furnace and heating tubes. He had invented cross-section boxes in which he could watch the root-development of the 40 to 50 thriving specimens in his different soil mixtures. The boy’s work was so good that the instructor sometimes brought his plants and boxes into the classroom to show what experimental science could do to turn the whole state into a garden.

It is not to be expected that all the pupils of the proposed Agricultural School will be possessed of faculties for original research work. But every boy will have a hand held out to him in his search for that mythical secret of the soil. He will be taught practical, scientific agriculture.

Is it worth while establishing such a school? I say emphatically, yes—for I have enough faith in human nature to believe that a fair proportion of the pupils of the school will become valuable workmen, even had I no examples of the success of similar institutions. Every boy who leaves this school with a good record will find immediate employment on the plantations or allied industries if he so desires. The planters stand ready to further any practical effort such as the proposal before us.

I may have wandered a little far afield. But, you see, there is the larger view.

I thank you for your attention.

RECLAMATION OF KAHOOLAWA.

At the meeting of the Board of Agriculture and Forestry held on February 12, 1912, the Superintendent of Forestry read the following report containing suggestions as to a method of starting the work of reclaiming the Island of Kahoolawe. No definite action was taken thereon at the time, but the members of the Board expressed themselves as in favor of the general plan outlined. The paper reads as follows:

Honolulu, February 9, 1912.

Committee on Forestry, Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I have the honor to submit as follows a report outlining a plan for starting the reclamation of the Island of Kahoolawe, which I recommend be approved by the board and put into operation:

As pointed out in my report on the setting apart of Kahoolawe as a forest reserve, dated June 23, 1910 (Hawaiian Forester and Agriculturist, September, 1910, Volume VIII, No. 9, pages 264-267), the main object of that action was to place the island under the control of the department of the local government best equipped to accomplish its reclamation.

To bring Kahoolawe back to a productive condition will require considerable time and carefully directed effort. It is not the purpose of the present report to request any cash outlay for this work, but rather to suggest a plan whereby, under a system of licenses, the portion of the island that is now productive—the pili grass country along the lee coast—can be made to yield an increasing revenue that may be used for the gradual improvement of the remainder of the island.

The value of the pili grass section rests largely in the fact that algaroba trees are gradually coming up all over it. In time as the forest spreads it will be of much more value, for stock feed, for honey rights and for wood. The feed furnished by the algaroba beans and the pili grass is sufficient to carry a limited number of horses, provided they can get water. With some slight repairs the cisterns and the wells already on the island can be put into shape to supply enough water for from 100 to 150 head. By the construction of additional cisterns the number of head for which there is dry feed could probably be doubled. By licensing the use of this section for some such limited number of horses, for a short term of years, under definite restrictions, not only will algaroba seed be spread more rapidly over the land, but in addition some revenue can later be got which could be used in the inauguration of other lines of reclamation.

An extension of time has recently been granted Mr. Eben P. Low, whose lease of Kahoolawe expired December 31, 1911, to rid the island of the animals now remaining thereon.

Following the removal of all sheep and goats from Kahoolawe, the next most important thing is to encourage the spread of the algaroba forest. Under all the circumstances I believe that for Kahoolawe the most effective available way of accomplishing this end is by such a method as that just suggested.

Mr. Low has figured the matter out carefully and believes that by using hardy Hawaiian mares, accustomed to a rough range, he could successfully raise a strain of mule colts sufficiently good to meet a certain demand in the local market. He estimates that he could sell his colts for enough to justify him in making the repairs that are needed to put the wells and cisterns into shape and in complying with the requirements as to reclamation that would be demanded by the government. That the matter may be brought to a head, Mr. Low has made application that such a license be granted him and has submitted a prospectus showing how he would operate the business.

The question before the board is twofold: First, as to policy; second, as to details in the matter of requirements, were such a license granted.

As to policy: As a forest reserve Kahoolawe is unique. The island was so set apart that it might come under the control of the Board of Agriculture and Forestry, as being the territorial department best equipped to effect its reclamation. When, eventually, it is again rendered productive, the idea is to take the greater portion of the island out of the reserve and use it as may then seem best, under such restrictions as may be necessary, for various forms of agriculture. This being so, a radically different method of treatment from that followed in most of the Hawaiian forest reserves is not only permissible, but essential. There is no money in sight for such work as the reclamation of Kahoolawe, and even if there were it is doubtful, in view of the pressing needs of many of our native forest areas, if it would be wise so to use any large sums for this purpose. By such an arrangement as is here proposed this obstacle is overcome, the island being made to pay for itself, and to increase in value as it does so. With the fulfillment of the conditions made on the part of the board, I can not see, even if the licensee should be unsuccessful in carrying out all his plans, how the government could suffer, for whatever had been accomplished would be all to the good of the island. For these reasons I believe the board would be quite justified in granting a license of the character proposed.

As to terms: Any license to pasture horses on Kahoolawe should contain the following provisions:

A.—Regulation of the license:

(1) The number of head should be limited so as not to exceed at the start one hundred mares.

(2) The period of the license should be for five years, with the privilege of an extension, with a revised schedule of payments, for five years more.

(3) The government should reserve the right to grant, either to the original licensee or to others, additional licenses for the apiary privileges, for the keeping of pigs, or for any other uses not inconsistent with the horse pasturing license, for each of which additional compensation should be demanded.

(4) The cutting of algaroba trees for export to other parts of the Territory should be tabu, except as special rights were granted, for additional compensation, to the original licensee or to others.

(5) It should be required that reasonable care be exercised not to misuse or injure existing houses and other improvements and that all new permanent improvements should become the property of the government upon the termination of the license.

B.—Reclamation provisions:

(6) The licensee should be required to take all reasonable measures to police the island and prevent injury to government property through trespass by fishermen and others.

(7) Provide at least one laborer to work under the direction of the licensee's foreman, in accordance with an outline of instructions to be drawn up by the territorial forester, to collect and feed algaroba beans to the horses at designated places, to collect the seed-impregnated manure at these spots and carrying it with pack animals, systematically to place it at strategic points along all the gulches, so that the spread of the algaroba forest may be hastened in the places where it is most needed. Later, were additional laborers employed, they should put in part of their time on other planting work, as of trees and soil-binding plants on the upland, coconuts along the shore, etc.

(8) Have his employees read the four rain gauges now installed on Kahoolawe and make and transmit to the territorial forester such other meteorological observations and records as may from time to time be required.

(9) Have his employees assist, as far as they reasonably can, such agents of the Board of Agriculture and Forestry as may visit the island, especially by allowing them the use of horses and by providing them accommodations at their camps.

(10) Use every reasonable endeavor to rid the island of any sheep and goats that may have escaped at the time of the drives.

(11) Later, at the expiration of the five years term, it will probably be found advisable to require the construction of fences to shut off the pili grass area from the upper lands, on parts of which by then some of the native grasses will probably have re-established themselves. A provision covering such work could

well be inserted when the schedule of payments came to be adjusted at that time. For the present it is not necessary that such fences be built, but it would be a good plan if the licensee were required, upon request, to fence in small plots at such points on the mountain as might be designated by the forester for experimental planting. It could be specified that not more than a stated length of fence, say 1500 feet, would be required in any one year.

It is, of course, necessary that a responsible person be secured as licensee. For several reasons Mr. Low seems to be as satisfactory a man to take charge of this work as the Board is likely to secure. Having had experience with Kahoolawe, he knows the difficulties that must be met. He is already equipped with boats whereby the island can be reached. And he has a liking for Kahoolawe that causes him to regard such a proposition as the present in the same light as another man might look upon some other avocation.

Believing, then, that the government stands to gain from whatever reclamation work is done on Kahoolawe and that the program here proposed is one that will work out satisfactorily in practise, I recommend that the Board approve it and authorize the issuance of a license containing the provisions suggested.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

A METHOD OF TAPPING THE CEARA RUBBER TREE.

The Agricultural Journal of the Mozambique Company, Vol. I., p. 49, describes a mode of tapping the Ceara rubber tree (*Manihot Glaziovii*), which is known as the Lewa method, as follows:

The tree is fit for tapping when the rough and papery outer bark has been removed. If this has not been recently done, the surface may contain dirt conveyed up the tree by little ants, so it is therefore advisable for the tapper to carry a stiff scrubbing brush for the purpose of cleaning the surface. The portion of the tree to be tapped is then painted over with a weak acid solution—acetic, citric, carbolic or fluoric acid. The juice of citrus fruits, such as limes, lemons or oranges, or seeds of the baobab tree soaked in water, will also serve the purpose; but clean solutions only should be employed, and absolute cleanliness practised throughout. In the portion to be tapped, almost point-like incisions should be made, and the latex oozes out and flows down and coagulates in thin ribbons on the bark. These incisions could be made 4 inches apart, as each incision drains the latex

from 1 to 2 inches in every direction from the wound. An ordinary pruning knife is suitable, but every care must be taken that the incisions do not reach the cambium layer; a very narrow chisel or a flattened bradawl will also serve the purpose; but it is better to use a knife with a guard, to prevent the incisions from being made too deep. If the latex does not coagulate quickly, the acid solution is not strong enough. In damp weather the acid will be required to be stronger than in cold weather. The requisite strength will soon be found from experience.

Formerly, when the system was first started in German East Africa, the rubber was rolled off the tree into round balls. It followed, of course, that particles of bark and dirt became mixed with the rubber, and the product was consequently of poor quality. Latterly, however, this method has been improved upon, and instead of the rubber being rolled into a ball, it is now rolled off from the tree onto a small wooden roller in such a way as to form a sheet when cut from the roller lengthways. The latter method is a great advance on the method of collecting in the form of balls, as the tapper can from time to time dip the roller into a pail of water and wash off particles of bark and dirt, and subsequently put the sheet through a water.

The tapper should be provided with a rough scrubbing brush, acid, and a small hand whitewash brush, for applying the acid, a wooden roller about 6 inches long by $2\frac{1}{2}$ inches in diameter, and a pail or calabash of clean water. In addition to the tapper it is advisable to have a second boy to follow him to collect the rubber, for if too many trees are tapped at a time the rubber from the first trees will not be so easy to roll off. When rolling the ribbons off they should be distributed over the roller as evenly as possible. It is desirable that the sheets should not be too thick, so the rubber should be removed at intervals according to the desired thickness. The size of the sheets would vary, of course, according to the size of the roller used. It is desirable that the sheets should be of uniform thickness and size, so the rollers should be all the same size. The rubber should not be exposed to light more than is possible, so whenever the roller is not in use it should be kept in a pail of water, and the sheets that have been collected should also be kept in water and brought in from the plantation twice a day, after the morning and evening tapping.

It is stated that further experimentation is necessary before a definite opinion as to the merits of this method can be expressed.

THE SMOKE CURE FOR RUBBER.

Little is known in Java about the cure of latex by smoking, this being the primitive method adopted nearly a century ago by the Amazon Indians and still survives, in the treatment of wild-grown Hard Para. Dr. K. Goeter, writing to the Sumatra

Post, explains the Brazilian treatment of the latex, and goes on to say: "It is, however, most noticeable and, according to the experience of Trillat and other investigators, that wood smoke contains another substance (besides creosote) having strong conserving properties, namely, formaldehyde, which, dissolved in water, is the formaline or formal of commerce. It was therefore thought probable that this stuff would be found in small quantities in smoked rubber. This was, indeed, found to be so. With the help of various sensitive reactions, I could undoubtedly show the presence of formaldehyde in smoked rubber sheets so that by reason of this result it may be taken that the conserving work of smoke on rubber must at least be partly attributed to the presence of formaldehyde in the smoke. In the development of smoke, it would be well to bear this in mind, by endeavoring to get a smoke that is as rich as possible in formaldehyde. Now it has been found that organic substances, for instance, sugar, will, through incomplete combustion, produce more formaldehyde when they are placed in contact with metals. From this we may also conclude that smouldering wood in contact with a metal, such as iron, will give a smoke with a higher percentage of formaldehyde than when that contact with a metal does not exist. The wood must smoulder; therefore, it must burn without flame, and this is only attained by limiting the admission of air. If there is too much air, less smoke is obtained and more fuel is used up; so that it is less economical from two points of view. It might be well also for planters to bear in mind that in smoke a poisonous gas, the well-known carbonic oxide is formed, of which the relative quantity increases under the last-named conditions. From a hygienic point of view, the health of the coolies working continually in an atmosphere of smoke should be considered. Whether smoking has a direct influence on the physical properties, for instance, on the elasticity of the product, I should not dare at present to decide. As a fact, it can only be said now that smoked rubber keeps better and is not so liable to mould as unsmoked rubber. As a rule, a higher price is paid for smoked rubber on this account."

CULTURAL DIRECTIONS FOR PAPAYA.

BY P. J. WESTER, Horticulturist.

The Philippines Bureau of Agriculture has issued the following directions for growing pawpaws which should prove of interest and be useful to Ceylon residents, says the *Tropical Agriculturist*. There are not nearly enough pawpaws grown in Ceylon.

SEED BED.—The seed bed should be prepared by thoroughly pulverizing the soil by spading or hoeing the ground well, and

the clearing away of all weeds and trash. Sow the seed thinly, about one to two centimeters apart, and cover the seed not more than one centimeter with soil, then water the bed thoroughly. In the dry season it is well to make the seed bed where it is shaded from the hot midday rays of the sun, under a tree; or, it may be shaded by the erection of a small bamboo frame on the top of which are placed grass or palm leaves. If the seed is planted during the rainy season a shed of palm leaves should always be put up over the seed bed to protect the seed from being washed out and the plants from being beaten down by the heavy rains.

TRANSPLANTING.—When the plants have attained a height of about seven to ten centimeters, they are ready to be transplanted to the place where they are intended to grow.

Unless the transplanting has been preceded by a good rain, the plants should be thoroughly watered before they are removed from the seed bed. In order to reduce the evaporation of water from the plants until they are well established in their new quarters, about three-fourths of the leafblades should be trimmed off.

In transplanting, take up the plants with so large a ball of earth that as few roots are cut or disturbed as possible. Do not set out the young plant deeper in the new place than it grew in the nursery; firm the soil well around the roots, making a slight depression around the plant; water thoroughly.

In order to protect the tender plant from the sun until it is established, it is well to place around it a few leafy twigs at the time of planting. It is well to set out three plants to each and as the plants grow up and fruit to dig out the males or the two poorest fruiting plants.

If the plants can not be set out in the field at the time indicated, transplant them from the seed bed to a nursery, setting out the plants about 20 to 30 centimeters apart in rows a meter apart, or more, to suit the convenience of the planter. While the best plan is to set out the plants in the field before they are more than 30 centimeters tall, the plants may be transplanted to the field from the nursery with safety after they are more than 1.5 meters high, *provided that all except young and tender leafblades are removed, leaving the entire petiole, or leafstalk, attached to the plant*; if the petiole be cut close to the main stem, decay rapidly enters it. If the entire petiole is left it withers and drops and a good leaf scar has formed before the fungi have had time to work their way from the petiole into the stem of the plant.

TREATMENT OF OLD PLANTS.—When a plant has grown so tall that it is difficult to gather the fruit, which also at this time grows small, cut off the trunk about 75 centimeters above the ground. A number of buds will then sprout, from the stump, and will form several trunks that will bear fruit like the mother plant in a short time. These sprouts, except two or three, should be cut

off, for if all are permitted to grow the fruit produced will be small.

SEED SELECTION.—Seed should be saved from the best fruits only. By this is meant not so much a *large* fruit as one that is sweet and well flavored, with a small seed cavity and few seeds; oblong fruit should be preferred to roundish ones in saving seed, as they grow on plants having both stamens and pistils in the same flower and these being, very largely, self-pollinated, the seeds produced from such flowers are more likely to reproduce their kind than the seed from roundish, melonshaped fruits, which mostly grow on female plants.

All male plants should be destroyed wherever they appear, as not only are they unproductive but by their pollen being carried to the fruiting plants they tend to produce degenerate plants when these are grown from the seed produced on plants growing in the vicinity of the male plants.

There is no need to fear that the other plants will not fruit if the male papayas are destroyed, for the reason that there are always plants about having *perfect* flowers and which provide sufficient pollen for the fructification of the female plants. This applies particularly to the Hawaiian papaya.

GENERAL REMARKS.—The papaya is very impatient of water standing around the roots and should be planted only on well-drained land; being easily injured by strong winds, it should be planted in sheltered situations. Keep the land clean of weeds and the plants well mulched.

THE EFFECT OF THE SUN IN THE TROPICS ON ANIMALS AND MAN.

BY HANS ARON,

(Professor of Physiology in the University of Manila.)

The rays emitted by the sun may be divided into three groups: (a) the ultra-red or heat rays; (b) the visible or light rays; (c) the ultra-violet or actinic rays. Freer, Bacon, and Gibbs have investigated the solar spectrum in Manila, and find that its range on the ultra-violet side is not greater than in northern regions, but its chemical activity in July as gauged by its action on oxalic acid and uranyl nitrate is from five to twenty times greater than in Chicago.

Many observers have ascribed the peculiar effects of the tropical sun to the action of the actinic and light rays on the human body. The negative results of the experiments on the American troops in Manila with orange-red colored clothing as well as numerous observations made in the tropics by Aron have convinced him that actinic theory cannot be maintained.

In order to determine the effect of the sun's heat rays in Manila, Aron made a number of experiments, some of which are quoted below.

One thermometer was placed in the rectum of a dead dog, and another under its skin, and the body suspended in the sun. The thermometer placed under the skin very soon registered a temperature of $46^{\circ}\text{C}.$, while the one in the rectum showed a gradual rise due to absorption of heat. A living body absorbs heat in the same way, but a rise in the body temperature is prevented by the physiological mechanism for increasing the loss of heat.

A dog kept exposed to tropical sunshine soon suffers from acute discomfort, and its rectal temperature is found to rise from 38°C to $39^{\circ}\text{C}.$; a thermometer placed under its skin, however, shows a rise to $40^{\circ}\text{C}.$ or higher. Rabbits placed under similar conditions show a greater rise of temperature, the thermometer placed under the skin recording as much as $46^{\circ}\text{C}.$, but when these temperatures are reached the animals soon die.

The most instructive experiments were those conducted on monkeys (*Macacus philip.*, Geoff.). When a strong and healthy monkey is placed, so that it is continuously exposed to the sunshine, its temperature rapidly rises, and seventy to eighty minutes' exposure, even between 8 and 9 a. m. in December or January, is sufficient to kill it. If protected from the direct rays of the sun, it can be kept in the same place for any length of time without suffering any injury.

Normally the rectal temperature of the monkey is 0.5° to $1^{\circ}\text{C}.$ higher than its subcutaneous temperature. When exposed to the sun's rays the body temperature rapidly rises, but the subcutaneous temperature is always 1° to $2^{\circ}\text{C}.$ above that of the rectum. The immediate effect of shaving a monkey is to reduce its temperature generally, but the effect is more marked on the subcutaneous temperature. When shaved monkeys were exposed to direct rays of the sun, the rise in temperature and subsequent death took place more rapidly than in similar animals whose hair had not been removed.

That the animals exposed to the sun's rays died as a direct result of hyperpyrexia is shown by the following experiments. Monkeys were exposed to the sun's rays as in the previous experiments, but by means of fans a strong current of air was directed on to the animal's body. In spite of several hours' exposure under these conditions the rise in body temperature was only slight, and the animals remained healthy. A control animal exposed within a few yards of the first one, but not artificially cooled, died of hyperpyrexia in fifty-eight minutes.

In another experiment the body of a monkey was placed in a wooden box with perforated walls, which was again placed inside a larger one, leaving an air space between the two, so that

its head was exposed to the sun's rays, but its body was thoroughly protected by the ventilated air space and walls of the boxes. The monkey was kept in this position and exposed to the sun's rays from early morning till night without any rise of body temperature taking place, or any signs of interference with its health. The same animal was exposed under similar conditions to direct sun's rays for altogether fifty-four hours within a period of twelve days, and apparently suffered no damage. During this period temperatures taken in the hair on the animal's head were frequently found to register as high as 47°C .

Some observations were then made as to the effect of sun's rays on the human skin. White and dark brown skins were selected and their normal temperature carefully determined; this varied between 32.5°C . and 33.5°C . There was no constant difference between the two colors. When exposed to the sun the skin temperatures rapidly rose to 36.5°C . or 37°C .; on continuing the exposure there was no further rise of temperature, but on the contrary a gradual fall of 0.5°C . to 1°C . was observed. The fall usually began with the appearance of diaphoresis. The fall was more rapid and greater when active exercise was being taken and there was copious perspiration. If the man had been working hard and perspiring freely before being exposed to the sun's rays, there was only a slight rise of the skin temperature. Dark skins did not, so far as the experiment went, show quite so much rise of temperature as white ones. A possible explanation may be that the dark skin absorbs more heat rays at first, but in consequence the sweat glands come into action sooner, and so prevent the temperature from rising as high as in the case of white skins.

Although the effect of the sun's heat on the human body is neutralized by physiological action, this makes certain demands on the human organism. This is shown by one set of observations, in which persons lightly clad were kept at rest but exposed to the sun's rays; the result of this exposure was to increase the pulse-rate by 8 to 12 beats, and the volume of respiration by 23 per cent. Under similar conditions a Philippine weighing 57 kg. lost weight to the extent of 280 grm. in one hour, although no allowance was made for the perspiration absorbed by his clothes.

When active exercise is being taken the heat produced by muscular action added to that absorbed from the sun's rays may produce a condition of collapse.

BLIGHT-RESISTANT COFFEES.

Since the advent of the coffee blight (*Hemileia vastatrix*) into the Philippines some twenty-five or thirty years ago, it has been practically impossible to raise even a fair crop of coffee below 2000 feet elevation. This blight destroyed the coffee industry not only in the Philippines but in Java, Ceylon and the Malay Peninsula at about the same time that it reached this Archipelago.

An attempt is being made now by several of the old coffee countries to discover or create one or more varieties of coffee which will be resistant to this fungus, and it is believed there is some hope in some of the new hybrids of robusta coffee (*Coffea robusta*). This Bureau now has growing at the Lamao experiment station a considerable quantity of this coffee, and a little later seed will be distributed to any one who wishes to experiment with the variety. However, like several of the non-commercial coffees this robusta does not have a first-class flavor, though it is in some respects better than that of either Liberian (*C. liberica*) or the Inhambane coffee of Mozambique. Another trouble with the new coffees is that they are for the most part very weak in caffeine, the active principal of the beverage—some of them possessing no stimulating qualities whatever.—*Philippine Agricultural Review*.

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RALPH S. HOSMER,
Superintendent of Forestry.

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EDW. M. EHRENHORN,
Superintendent.

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No. .4

THE NEW PRESIDENT.

Mr. W. M. Giffard, the new president of the board of agriculture and forestry, was the first member to receive a commission when the board was organized under the act creating it. For some years he was out of the board, having resigned on account of pressure of business while manager of the late corporation of W. G. Irwin & Co., Ltd. It was during his former membership of the board that Mr. Giffard established the Hawaiian Forester and Agriculturist, being its editor for the first few years of its existence with the present editor as his assistant part of the time. Incidentally to his devotion to domestic arboriculture, which is well-known in Honolulu from the beautiful cultures wherewith he has always had his home surrounded, Mr. Giffard has long been an enthusiastic amateur in entomology, so much so that he takes rank among the professional entomologists. When formerly a commissioner of agriculture and forestry, he made a record as chairman of the committee on the division of entomology. A few months ago Mr. Giffard was induced to take the direction of the fruitfly control work, as an honorary member of the same committee. His management of the campaign thus far is familiar to the Forester's readers, who will find his latest report thereon in the present number.

RECORDS OF AYRSHIRES.

A report of the annual meeting of the Ayrshire Breeders' Association, held in January at the Manhattan Hotel, New York, has been received. The following data will be of interest to Hawaiian cattle raisers and dairymen:

"The report for the past year showed an addition of 91 new members, and a largely increased addition to the number of registered animals.

"In the mature class, Netherhall Brownie 9th, owned by Mr. J. W. Clise, Redmond, Wash., gave a record of 18,110 lbs. of

milk, 820.91 lbs. of fat, equal to 958 lbs. of butter, with 4.69 per cent. fat.

"In the three-year-old class McAlister's Betty, owned by Mr. Percival Roberts Jr., Narberth, Pa., gave a record of 14,208 lbs. of milk, 581.41 lbs. of fat, equal to 678 lbs. of butter, with an average of 4.19 per cent. fat.

"The average result of the advanced registry work during the past year was, 68 two-year-olds averaged 7610 lbs. of milk, 306.52 lbs. of fat, equal to 353 lbs. of butter, with an average of 4.04 per cent. fat.

"Thirty-six three-year-olds averaged 9318 lbs. of milk, 374.41 lbs. of fat, equal to 432 lbs. of butter, with an average of 4.14 per cent. fat.

"Twenty-four four-year-olds averaged 8723 lbs. of milk, 349.93 lbs. of fat, equal to 408 lbs. of butter, with an average of 4.12 per cent. fat.

"Ninety-seven mature cows averaged 9923 lbs. of milk, 332.03 lbs. of fat, equal to 442 lbs. of butter, with an average of 3.875 per cent. fat.

"The average of the whole, cows and heifers, is 8850 lbs. of milk, 351.21 lbs. of fat, equal to 408 lbs. of butter, with an average of 4.04 per cent. fat.

"The exhibit at the National Dairy Show was particularly fine, with five full herds shown by J. F. Converse, Woodville, N. Y., W. P. Schanck, Avon, N. Y., Ryanogue Farms, Brewster, N. Y., Branford Farms, Groton, Conn., and Willowmoor Farms, Redmond, Washington. The exhibit as a whole was of high quality and type, and attracted a great deal of attention.

"Perhaps the most conspicuous animals in the ring were Beuchan Peter Pan, imported and owned by Mr. J. W. Clise, of Willowmoor Farms, a bull that had never been beaten in the show ring, either in Scotland or America.

"The most sensational exhibit in the ring was the champion cow Oldhall Ladysmith 4th, owned by Mr. P. Ryan of Ryanogue Farms, Brewster, N. Y., who was not only champion and grand champion in her class, but also the winner of the \$500 silver trophy offered by Mr. John R. Valentine, President of the Ayrshire Breeders' Association, for the cow representing the most perfect type of her breed shown."

ARBOR DAY REMINISCENCES.

Someone has sent the Forester a clipping from the Sunday Advertiser's collection of events of twenty-five years ago, containing the following item:

"A meeting of the Royal Hawaiian Agricultural Society was held last evening. The date for the Stock Fair and Horticultural Show was fixed for next May. The desirability of establishing an 'Arbor Day' here was discussed at some length and it was arranged to communicate at once with the president of the board of education on the subject with the view of having a general holiday for school children established for this excellent purpose."

If recollection serves truly, the present editor of the *Forester* was one who agitated the institution of "Arbor Day" in Hawaii, if not the first one, having in the East before coming here taken an active part in "Arbor Day" exercises. As a representative of a press organization he assisted in planting a "press tree" on Montreal city hall square, upon an "Arbor Day" about thirty years ago.

TEACHING OF ENGLISH.

Professor M. M. Scott, principal of McKinley High School, delivered an address before the teachers' meeting, at that institution recently, on "Essential Points to be Emphasized in the Teaching of English."

After a few preliminary remarks on China and Japan and a comparison of the Chinese and Japanese languages with the English language, Professor Scott showed that these people failed to grasp the English language by not mastering the tenses of verbs, the plural of nouns, the sounding of the aspirate "th," final "t" and final "ed." He said that the problem in this country was the English problem and that if anything was to be accomplished in this mixed nationality the teachers must exert themselves to make the pupils speak good English and write good English. He suggested that the foundation be drilled into the pupils in the third and fourth grades of the primary; emphasized more in the fifth and sixth grades of the grammar and then smoothed off in the seventh and eighth grades so that when they entered the high school, the English language would be "jack-planed" for the high school teachers. "Teach them at the beginning when they get a little vocabulary to write and talk correctly. Children should not be taught from books alone. Have them write a sentence every day and then a paragraph. Mark the errors and put them on the board. First, pronunciation; second, tenses. Have them think what they wish to say and then speak it or write it."

Prof. Scott said that the teachers in the lower grades should insist on these points and the student would improve and then these difficulties would not be met with to so great an extent in the high school. The deficiency of so many of the students entering the high school this last year necessitated having a special

class in English every Wednesday afternoon in which they received such drill as should have been received in the lower grades. Prof. Scott remarked that even high school seniors continued to make these common errors, already mentioned, and the only solution to the problem was to constantly drill them in good English and insist on their using it in speaking and writing. He said the Chinese made the most mistakes, and second the Hawaiians and part-Hawaiians, who spoke Hawaiian at home. He asked that the primary and grammar grades do their part in preparing the students for the high school and then the high school teachers would do the rest.

Apropos of tree planting by sugar plantation companies, the suggestion made by Mr. James Gibb, manager of Honolulu Plantation, Oahu, at the annual meeting of the Hawaiian Sugar Planters' Association, is of interest as indicating the trend of opinion among plantation men. Mr. Gibb recommended that each plantation company set out one tree for every ton of sugar produced during the past year. As the total output for the Territory for 1911 was 566,821 tons, this would make a very creditable showing.

FRUITFLY CONTROL.

Honolulu, February 26, 1912.

To the President and Commissioners of the Board of Agriculture and Forestry, Honolulu, T. H.

GENTLEMEN:—As previously advised, the Mediterranean fruit-fly made its appearance in the North Kohala district on the Island of Hawaii during the latter part of January. In consequence of this and in order to prevent, if possible, its introduction into other districts of that Island, your director suggested that he and the superintendent of entomology visit Hawaii for the purpose of hastening the organization of committees to take charge of such campaign as might be found necessary. With the permission of the president of the board, I requested that Mr. Ehrhorn be sent direct to Kohala to investigate that district and to, if possible, secure data as to the limits of infestation. He was also requested to secure the organization of a special committee to handle conditions in such manner as any subsequent regulations of your board might make necessary. Mr. Ehrhorn's visit to Kohala and the result of his work and investigation are given in detail in his report to me under date of Feb. 20, a copy of which I beg to submit herewith. His report is self-explanatory.

The organization of campaign committees in the Hilo, Kau and Kona districts was personally attended to during a recent visit

to Hawaii. In Hilo the matter of organization for that district was handled by the Hilo board of trade at a meeting held on the 7th inst. At that meeting I fully explained the situation in so far as the district of Hilo was concerned and outlined a plan of campaign to prevent, if possible, the introduction of the pest from adjacent districts, as well as from the port of Honolulu or any other infested ports in the Territory, which Hilo was in communication with. The whole matter was thrashed over with the members of the board of trade and they were assured of the coöperation and assistance of the Territorial board of agriculture in any campaign they might efficiently organize. The result of the Hilo meeting was that a committee of five members were appointed to handle the situation there, consisting of A. Lindsay (chairman), H. V. Patten, E. F. Nicolls, D. S. Bowman and Brother Matthias.

From Hilo I proceeded to Kau and Kona and in both of these districts I met the prominent members of local organizations and explained matters to them in the same manner as I had already done in Hilo. In Kau Messrs. W. G. Ogg and C. Wolters promised to handle the campaign, and in Kona three members (Messrs. Macfarlane, Curts and Wallace) of the executive committee of the Kona Improvement Club also assured me that they would keep in line with what was done in the other districts of Hawaii. The Kona coffee growers appeared to be somewhat worried (and rightfully so), because of the possibility that the fruit-fly pest might be brought into their district from Kohala by road conveyances coming from the latter district and were anxious that any regulations formulated by the Board would include the prohibition of all Hawaiian fruit from any section of North and South Kohala, in addition to the seizure and destruction of any which might be landed at any of their ports. I assured them that the object of the board of agriculture was that any regulation passed and having force of law would not only provide for the conditions which already existed in Kohala but also would, as far as was possible, protect the other districts of the island against the introduction of the pest by way of both ports and public highways. The organizations in all the above-mentioned districts have been informed in a like manner.

Before leaving Hawaii I gained the impression that each of the organized committees would endeavor to secure funds either through the county supervisors or by private subscription, or both. The general opinion prevailed, however, that the Territorial government should, if at all possible, assist financially in their campaign and I would therefore suggest that this important question be taken up by your board at an early date.

Since my return from Hawaii I have communicated with the agents of the several plantations located in the Hamakua district and have asked for their assistance and coöperation in getting the managers together and forming an organization to

manage the campaign in that section and quarantining it against North and South Kohala, in so far as the introduction of Hawaiian fruits are concerned. The ports of Hamakua are to be included in any organization of inspection the same as the ports in other districts are intended to be.

As regards the transportation of any Hawaiian fruit by means of the belt roads leading out of the Kohala district, so far as I could learn from the committees in Kona and Kau more particularly, it was the intention to have gates placed on these at certain points of entry and there hold up and inspect all conveyances and, if necessary, seize and destroy all Hawaiian fruit which may be found in these.

As a result of correspondence with the Maui chamber of commerce, it has been learned that that body has already organized a campaign to prevent the introduction of any Hawaiian fruits at its ports of entry. So far as is at present known, the Mediterranean fruitfly is not yet established on Maui, but it will not be long before we hear of its establishment there unless the most rigid precautions are taken against the entry of any Hawaiian fruits at its ports. In addition to its weekly importations of freight and passengers from Honolulu, it has the further disadvantage of having almost daily intercourse with its neighbor, Molokai, by means of sampans and other small craft. Any new regulations passed by your board should, therefore, make it prohibitive for Hawaiian fruits to be shipped or taken on any inter-island carrier when said carrier is plying from any infested to a clean port of entry.

Immediately upon my return from Hawaii, I took up the matter of the necessary regulations with your president and the attorney general and the latter is now formulating such as I trust will not only meet with your approval but will also meet present requirements on the islands of Hawaii and Maui. As soon as you have adopted these regulations and have given them the force of law by the Governor's approval, I would respectfully suggest that the necessary authority be given to issue commissions to all the members of the organized committees on the islands of Maui and Hawaii, as well as to the inspectors which the said committees may officially appoint.

In conclusion, I desire to say that whilst a *rigid, efficient and continuous* method of inspection, seizure and destruction of all Hawaiian fruits, vegetables, etc., at any ports of entry, and, where necessary, along any belt roads on any island or in any district not at present infested with the Mediterranean fruitfly pest may prolong the period of immunity, it is my candid opinion that there will always be an element of danger of infestation because of the failure of inspectors to appreciate the grave danger in allowing or accidentally passing a single Hawaiian grown fruit of any kind whatsoever in the belongings of any passenger or in freight packages. Again the possibility, at some future time, of the

fruitfly migrating from one district to another by means of a continuous forest belt as prevails in some districts on Hawaii is not to be ignored. It is well known to entomologists that much of the Hawaiian or indigenous flora in the mountain regions on these islands produce fleshy fruits which are just as liable to infestation as those of the kamani, which flourish on the lower elevations. The fruit of the kamani has but little fleshy material in it, yet we know it to be very badly infested in sections where the fruitfly has become established. The same may be said of the pulp of the coffee berry. The guava in a wild state, as is known to exist at even very high altitudes, is the greatest menace we have on all the islands in the Territory because of its well known adaptability for the reproduction of fruitfly. Like Oahu, there are districts on Hawaii and Maui where, because of the large areas of wild guava, it would be next to impossible to either eradicate or use any practical methods of culture were the pest once established in that region. Kohala on Hawaii I believe has to some extent the conditions I speak of and it will be the sheerest luck if its committee succeeds in exterminating the fruitfly, notwithstanding that it is said to be established as yet in only a comparatively small area. Hamakua, Hilo and Kona have similar conditions on the mountain slopes up to a fairly high elevation, whilst Kau, I believe, is somewhat more fortunate in the above respect.

Preventive natural conditions are certainly almost ideal in the districts of Kona and Kau, in so far as the introduction of the fruitfly from other adjacent sections, as there, there are either extensive aa flows or sand deserts which are practically, if not altogether, bare of vegetation, and which, as barriers, should naturally protect these districts. The infestation in Kau and Kona, therefore, will almost altogether be made possible only by the introduction of Hawaiian fruitfly by means of the various ports of entry in these districts or by means of transportation (autos or wagons) along the belt road leading from Kohala on the one side or Hilo on the other.

Respectfully submitted,

W. M. GIFFARD,
Director, Fruitfly Control, Board of Agriculture and Forestry,
Honolulu, T. H.

FOURTH MONTHLY REPORT.

Honolulu, March 4, 1912.

To the President and Commissioners, Board of Agriculture and Forestry, Honolulu, T. H.

Honolulu Fruitfly Control.

GENTLEMEN:—I beg to submit you a report of the work of

this department for the month ending February 29, 1912, viz:

Inspection. Since the beginning of February there have been eight inspectors employed to cover all the districts and precincts within the quarantined area extending from the western boundary of Waialae to the eastern side of Moanalua, but excluding the "heights" and valleys back of Honolulu. These latter sections will from now on receive as much attention as prevailing conditions and the small working force will allow.

General Conditions. These I am pleased to report are much more satisfactory than they have yet been. Considering that up to a month ago only four inspectors were available under the financial conditions then prevailing, it is gratifying to find that the present fruit and pest conditions are so satisfactory. The addition of four extra men in February, made possible through the financial coöperation of California, has helped very materially in cleaning up many infested sections which could not previously be satisfactorily attended to. Continuous daily and systematic inspection of the various precincts and the coöperation of the large majority of householders have very materially assisted in ridding the whole quarantined residential section of infested fruits. These must not, however, include the mango, which is now coming into full bearing. As a whole, I should say that the present infestation is very much less than it was during last summer before the campaign started. In previous reports I mentioned the lack of coöperation on the part of many citizens, who failed to respond when called upon to strip their trees of ripe or overripe and infested fruits. These householders, although comparatively few in numbers, have caused much extra work and have also been the cause of repeated inspections on the part of inspectors. Many have had to be continually reminded of the penalty called for by the regulations. Fortunately the department has been able up to this time to cope with the situation without having recourse to the courts, although it may be that one or two delinquents may shortly make it necessary to bring about such an undesirable proceeding. It is certain that, had it not been for such lack of coöperation, conditions of infestation in some districts would be much better than they are or are likely to be.

Preliminary inspections on the "heights" and valleys back of Honolulu, all of which include the most northerly precincts in the quarantined districts, appear to show that the infestation of wild guava is by no means as great as might have been expected, in view of the conditions which existed in the residential area before the clean culture campaign started. I hope to be able to report to you further as to this as soon as the mango season is over. The full force of inspectors will be required during the next month or two to see that all fallen mangoes are daily cleaned up and thoroughly destroyed. In many cases this labor will be forced on the department, as many of the poorer householders are

without yardmen and have no means of paying for any extra labor arbitrarily thrust on them.

Insular Conditions. In my last report I referred to the condition which had made itself manifest in North Kohala, Island of Hawaii. In consequence of this, I was requested to visit the districts on Hawaii and there organize committees of control, the idea being that each district would handle its own peculiar conditions. The results of my visit and that of Mr. Ehrhorn, the superintendent of entomology, have already been submitted to you by a special report. Since my return from Hawaii your board has adopted a new regulation (Rule XIV), having particular reference to any fruitfly conditions on the island of Hawaii. I am pleased to report that the Governor approved of this regulation the day it was transmitted to him and copies thereof have already been sent by me to the chairman of the committee in each of the districts of Hawaii. The regulation in question will be printed in due course.

In my last report I referred to a questionable case under observation in the laboratory, from Kona, Hawaii. I am now much pleased to say that the breeding of the fruit under suspicion produced melon fly (*Dacus cucurbitas*) and not the Mediterranean fruitfly (*Ceratitis capitata*). We still have other fruits under observation from Hawaii, which may have to be reported on later.

I would also report that the attorney general is at present formulating another regulation suitable to present conditions on Maui and Lanai, where the fruitfly, as yet, has not been found. This rule will give power to local authorities on the above named islands to prevent the introduction of any Hawaiian fruit (excepting bananas and pines) at the landings. Just as soon as this regulation has been drawn it will be submitted to your board for consideration.

General Remarks. In view of the fact that Rule X has not been found to exactly fit conditions as regards fallen fruit, your director has requested the attorney general to formulate an amendment whereby it will be compulsory on the householder to clean up and destroy fallen mangoes and other fruit daily. This amendment will shortly be submitted to your board for adoption or for such other action as may be deemed necessary.

Since my last report the following Honolulu fruits have been found by us to be infected with the Mediterranean fruitfly and should be added to the long list of those already reported on, viz.: Kumquat (*Citrus japonica*), *Murraya exotica* (small red fruit locally known as mock orange), *Eugenia* (species).

I would further report that coffee berries, varieties of orange, loquats, varieties of eugenia, and kamani seeds (species) appear to be among the worst infected fruits so far examined. It is not to be inferred from this, however, that other fruits are not also more or less attacked. Peaches are again coming into season and these will have to be specially watched, as that variety of

fruit is one which always receives the early attention of the fly.

Application has been made by your director to the superintendent of education to have its teachers educate the younger scholars in the public schools as to "clean culture" methods in the fruit garden. This is intended more particularly to secure the assistance of the youngsters in keeping the grounds of their parents free of fallen fruit and the proper disposal of same. The habits of certain classes of school children as to gathering ripe mangoes from trees and throwing the refuse on the sidewalk or thoroughfare, or in undue handling of infested but otherwise fair-looking fruit waiting for the garbage collector, is well known to many of us. It is quite possible that the teacher and scholar can coöperate with and assist this department on the lines suggested.

The superintendent of entomology has now in preparation a circular on the Mediterranean fruitfly, which, as soon as published, will be distributed to householders and to the board of education. This circular will no doubt be desirable as filling a much felt want.

Mr. H. A. Weinland, representing the California horticultural commission, has, among other duties assigned him by that body, continued to coöperate with the work of this department. Mr. Weinland has been paying special attention to the trapping of adult flies, as well as exploiting general conditions in and outside of the quarantined area.

Respectfully submitted,

W. M. GIFFARD,
Director, Fruitfly Control, T. H.

DIVISION OF FORESTRY.

Honolulu, Feb. 29, 1912.

*Hon. Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.*

GENTLEMEN:—I have the honor to submit as follows the routine report of the division of forestry for February, 1912:

Forest Reserve Work.

On February 2, in company with Messrs. L. L. McCandless and H. M. von Holt, I visited the Government land of Kuokala, near Kaena Point, Oahu, to look into the question of fixing a

forest reserve boundary across its upper end. During March it is expected to have this line definitely laid out by a surveyor.

February 5 and 6, I was at Nanakuli with Mr. H. E. Newton of the Territorial government survey, marking out the forest line on the ground. Eight forest reserve monuments were erected at Nanakuli. The other points on the line were marked with small iron pipes.

During the month further progress has been made on several other forest reserve projects, which will be reported on in detail later.

At the board meeting held on February 12, I submitted reports on a plan for starting the reclamation of Kahoolawe and on a proposal from Mr. C. G. Owen to plant with forest trees a portion of the Pupukea forest reserve, Oahu.

Tree Planting Contract.

Mr. Owen's offer was to plant, mainly with eucalypts, an open tract of between 30 and 35 acres, a part of the area formerly known as "Water Reserve C," adjoining the section planted with trees under contract two years ago in return for the privilege of using the area for growing one crop and one ratoon crop of pineapples. The area is a narrow strip lying along the bluff overlooking the Kaleleiki gulch.

Ever since the Pupukea forest reserve was set apart it has been the intention of the board to plant up this area. Only lack of funds prevented its being included when the adjoining area was planted. By the present arrangement the planting is done without any cash outlay by the government, the trees, however, which are to be set out upon the removal of the ratoon crop getting the benefit of the cultivation given the pineapples.

The board having approved the general proposition, carefully worded specifications covering the planting were drawn up and embodied in a contract which was signed on February 23. The faithful performance of the contract is guaranteed by a bond deposited by Mr. Owen with the board.

Tantalus Forest.

On February 12, I published, as chief fire warden, a notice renewing for one year the period during which permits must be obtained before fires for burning brush may be started on Tantalus.

Later in the month an arrangement was effected with Mr. J. W. Caldwell, the new county road supervisor, in regard to completing the cutting of trees along the Tantalus road begun but soon after discontinued last year, under a previous administration. By having our Tantalus forest ranger exercise a general supervision over the Tantalus road cantoniers it is believed that a

good deal more can be accomplished than heretofore in putting the road into shape and keeping it so.

Experiments with New Rubber Trees.

Through the courtesy of Dr. A. Marques, the French consul, there was received in February a small consignment of the seed of *Ficus Schlechterii*, a tree from New Caledonia supposed to be of value as a rubber producer. Samples of this seed were sent to the managers of the several rubber companies and to the sub-nurseries of the board for trial.

From Puuwaawaa, Hawaii, Mr. J. F. Rock, consulting botanist, has recently sent in samples of the latex of a native Hawaiian tree, *Euphorbia lorifolia*, that appears to have possibilities as a rubber producer. The Hawaii agricultural experiment station is now making analyses of the latex of this tree. As yet there is nothing tangible to report. Mr. Rock writes that there are several thousand acres covered with this tree in North Kona.

Botanical Exploration.

Mr. Rock is now on Maui, having gone over from Kona on the last steamer. He reports having secured much interesting material from that district. Incidentally, he made an ascent of Mauna Loa from one of the dairy stations on the Greenwell ranch, establishing a new record as to time, in that he started at 4 a. m., reached the summit crater, Mokuaweoweo, and got back to a temporary camp in the edge of the forest the same night; from his account a somewhat strenuous excursion.

Mr. Rock is now collecting on the slopes of Mt. Haleakala. He expects to return to Honolulu about March 20.

Repairs to Office Building.

During the latter part of February the roofs of the main office building at the Government nursery and of the recent addition to the stables were painted with "Elastikote" paint. This ought to add considerably to their durability.

Report of the Forest Nurseryman.

As usual there is transmitted herewith the report of the forest nurseryman, covering the work of the month that comes under his direct charge.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

NURSERYMAN'S REPORT.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following report gives the principal work done during the month of February:

Distribution of Plants.

	In seed boxes.	In boxes transplanted.	Pot-grown.	Total.
Sold	400	1,520	1,975	3,895
Gratis .....	...	1,500	474	1,974
	<hr/> 400	<hr/> 3,020	<hr/> 2,449	<hr/> 5,869

Collections on account of plants sold amounted to \$45.65.

Plantation Companies and Other Corporations.

No new orders have been received during the month. Tree planting on most of the plantations is practically finished for the season owing to the dry weather coming on and the labor being required for other work. The number of trees distributed under this head during February amounted to 26,200 seedlings. The roof of the potting shed has been extended to cover the soil and sand bins, and a new bench has been made for the workshop and toolshed.

Experiment Garden, Makiki.

The men at this station have been doing routine work, such as potting plants, transplanting and doing other work in connection with replenishing the stock, which was nearly exhausted owing to the numerous demands that we have been receiving during the past few months.

U. S. Experimental Planting, Nuuanu Valley.

The two men are kept busy hoeing and keeping down the grass. During the month of March we expect to plant more trees which are now ready at Makiki.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman

DIVISION OF ANIMAL INDUSTRY.

Honolulu, February 29, 1912.

To the Board of Commissioners, and Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Gentlemen:—I beg to report on the work of the division of animal industry for the month of February, 1912, as follows:

Animal Quarantine Station.

Pursuant to the instructions from the Board, I have engaged Mr. Albert Davenport, until recently farrier in the 5th U. S. Cavalry, to take charge of the animal quarantine station. Mr. Davenport reported for duty on March 1, and is now in full charge of the station. His compensation is to be \$45 per month, quarters, light, fuel, and feed for one horse.

The construction of the kennels has been considerably delayed on account of inclement and rainy weather, which has practically made it impossible for the concrete work to be finished in time for the carpenters to do the construction of the fences. Provision has been made for the quarantine of twelve dogs in separate kennels, as follows: Four kennels for lap dogs; five for medium sized dogs up to pointers; and three for large dogs as Great Danes, etc. Care has been taken to have the entire construction made as sanitary and modern as possible with the means allowed and even then it has been found that the \$600 allowed for the purpose will barely suffice for the finishing of the kennels, leaving nothing for the provision of quarters for the keeper. It is estimated that an additional \$250 will be required for the extension of the present office so as to provide sleeping room and kitchen and to install the necessary conveniences such as washstand, shower bath and toilet, as well as a cook stove and utensils for the preparation of food for the quarantined animals.

Tuberculin Test of Dairy Cattle in the City and County of Honolulu.

The assistant Territorial veterinarian, together with the milk inspector, detailed by the city and county physician for this purpose, has practically finished the test of all the dairy cattle in the city proper, and will begin testing the cattle belonging to the railroad ranches at the commencement of next week. The test has proved very satisfactory, the percentage of reactors remaining below 5% as compared with 11% at the former test and 27% on the first test. The present percentage will, however, be perceptibly lowered, as it is safe to conclude that but a very small percentage of reactors will be found among the range cattle and the dairy cattle in the outlying districts, which are kept in a stable

only for a short period of each day, or else never come into a stable.

Of the 1600 head of dairy cattle tested in the city, less than 90 have given reaction, and it is a pleasure to state that with very few exceptions the owners of reacting animals have been ready to sacrifice them without question. The further fact that up to this date not a single animal among the reactors has been condemned on post mortem examination as unfit for food, demonstrates the fact that all of the bad cases of tuberculosis have been wiped out during the first two tests and those which are now reacting have been but recently infected, and in most cases as a result of the owners retaining reactors from the former tests on their premises, and thereby continuing the infection in their stables and yards.

Importation of Livestock.

The usual number of steamers have arrived during the past month, and, as will be seen from the report of the assistant Territorial veterinarian, a large number of horses and mules have arrived here, the greater number, however, coming from Seattle, and only two shipments requiring quarantine as coming from or through California. No dogs have arrived so far, but sufficient quarters have been finished to accommodate them should any arrive from this time on.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT FOR FEBRUARY.

Honolulu, February 29, 1912.

Dr. Victor A. Norgaard, Chief of the Division of Animal Industry, Bureau of Agriculture and Forestry.

Sir:—I have the honor to submit herewith a report of the work accomplished during the month of February.

Tuberculosis Control.

The work of testing the dairy herds is progressing rapidly and is meeting with no opposition on the part of owners. Less difficulty is experienced this year in getting owners to dispose of their reacting animals immediately. In fact, they now appear anxious to get rid at once of any source of infection and to have and maintain herds free from tuberculosis. It has taken time, and the experience of heavy loss on the part of some, from one or two reactors being kept in the herd, to bring about this much desired

spirit. Such coöperation on the part of owners makes the task of fighting this disease to a finish much easier.

The following is a list of the different dairies tested up to the present time, giving the total numbers of cows tested; the number passed, and the number condemned:

	T.	P.	C.	Remarks
Wm. Gomes	10	9	1	
J. H. Cummings.....	5	5	0	
D. P. R. Isenberg.....	337	312	25	1 bull
Marshall & Azevedo.....	28	26	2	
P. M. Pond	37	36	1	
M. Gomes	28	28	0	
H. B. Brown.....	13	13	0	
S. J. Grace.....	5	5	0	
Capt. Hartman	3	3	0	
J. E. Faria.....	20	20	0	
R. Compos	12	12	0	
Frank Gouveira	24	24	0	
J. Quintal	2	2	0	
J. M. Whitney.....	10	9	1	
T. F. Farm.....	45	42	3	
Omai Tatsuichi	10	10	0	
F. C. Krauss.....	1	1	0	
K. Inouye	8	8	0	
W. P. Alexander.....	5	5	0	
I. Nagaki	15	15	0	
J. H. Cummings.....	4	4	0	
Mrs. C. M. White.....	10	9	1	
Frank Medeiros	12	12	0	
P. Miyakawa	13	13	0	
J. Allencastro	7	7	0	
K. Yamashita	7	6	1	
S. Hirata	14	14	0	
C. K. Quinn.....	6	6	0	
Chas. Frazier	1	1	0	
College of Hawaii.....	15	13	2	
H. E. Cooper.....	15	15	0	
Frank Andrade	81	80	1	
Kawaiahao Seminary	15	15	0	
Mrs. Mary Quintal.....	8	8	0	
S. Tsumoto	9	9	0	
M. Kawamura	6	6	0	
Mrs. W. W. Hall.....	1	1	0	
G. L. P. Robinson.....	5	5	0	
Frank Valph	6	6	0	
Chas. Bellina	138	112	26	
S. de Nobriga.....	13	13	0	

College	12	12	0	
el Abreu	3	3	0	
Rezants	13	13	0	
Day	5	5	0	
Wond	18	18	0	
e Pires	8	8	0	
Holt	37	35	2	1 bull
ameha Schools	44	42	2	
Miles	17	16	1	
Correa	13	12	1	
Mary Riedell	10	9	1	
ino Souza	35	33	2	
nder Young Dairy..	46	46	0	
ro Tello	2	2	0	
P. Mendonca	10	10	0	
Fernandez	8	8	0	
Silva	4	4	0	
ilder	2	1	1	
d Kapena	2	1	1	
vash	3	3	0	
E. Johnson	2	2	0	
Damon	148	143	5	
r Carter	13	13	0	
ta	1	1	0	
Bellina	28	28	0	
Lucas	90	80	10	2 bulls
otal	1,578	1,488	90	4 bulls
1 S. M. Damon ranch	185	181	4	

following is a list of the importations of livestock at Honolulu the date of the last meeting, February 9, 1912:

l. Lurline, Feb. 14, 7 crates poultry; S. S. Mexican, Feb. mules, Q. M. Dept., 3 horses; S. S. Sierra, Feb. 19, 3 crates se games; S. S. Korea, Feb. 26, 3 dogs; S. S. Honolulu, 8, 2 bulls (shorthorn), S. M. Damon, 1 bull (shorthorn), 7 crates hogs, 2 crates poultry; S. S. Hyades, Feb. 28, les, Schuman Car. Co., 11 hoises, E. E. Paxton.

Respectfully submitted,

L. N. CASE,

Asst. Territorial Veterinarian.

QUARANTINE KENNELS.

ed Statement of Expenditures to date in construction of kennels at Quarantine Station, Honolulu.
te work, contract price 27c per square foot, 560
are feet in 13 separate squares (O. Oss).....\$151.20

Wire fence, 60 in. high at 250 ft. at 40c (Axtell).....	100.00
Wire fence, 42 in. high at 270 ft. at 38c (Axtell).....	110.60
Wire fence, 36 in. high at 150 ft. at 25c (Axtell).....	37.50
Lumber, staples, hinges, nails (Allen & Robinson).....	126.37
Sewer pipe, strainer, lead pipe (Hon. Iron Wks.).....	11.00
Labor, supervision to March 9, incl. (O. Oss).....	122.00
	<hr/>
	\$658.67

With an additional bill for labor, not exceeding \$40, the kennels proper will be finished, all the required material being on hand.

In regard to the keeper's quarters, the contract estimates that the same can be made habitable for approximately \$200 to \$250. As the room which is now used as office and laboratory must be continued as such and at the same time be made into a living room for the keeper, it will be necessary to build an addition or lean-to in which he can prepare his meals, sleep and dress. A kitchen sink will act as wash basin also and a shower bath and water closet at a slight distance can be constructed cheaply.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, February 29, 1912.

Hon. Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the division of entomology for the month of February as follows:

During this month we boarded 40 vessels and found vegetable matter on 24 of them. Careful inspection of all shipments was made with the following result:

<i>Disposal with principal causes:</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	771	21,622
Fumigated	14	410
Burned	16	38
	<hr/>	<hr/>
Total inspected	801	22,070

Rice Shipments.

Twenty-five thousand four hundred and twenty-four bags of

rice arrived during the month, and being found free from insect pests was permitted to enter the Territory.

Pests Intercepted.

Thirty-eight parcels of fruit and vegetables were taken from immigrants at the U. S. immigrant station, and several lots of plants were destroyed on account of blights and scale-insect infestations.

Beneficial Insects.

One lot of Japanese beetle fungus was sent to Wailuku, Maui.

Hilo Inspection.

Brother M. Newell reports the arrival of five vessels at the port, finding three carrying vegetable matter, consisting of 83 lots and 1606 parcels, all passed as free from pests.

Inter-Island Inspection.

During the month of February 60 steamers were attended to, and the following shipments were passed on: 158 bags taro, 53 cases plants, 14 bags taro tops, 2 cases sugar cane, 1 case cabbage. Total, 228 packages.

The following packages were refused shipment: 24 packages fruits, 11 packages vegetables, 3 lots of plants, 1 box of sugar cane. Total, 39 packages.

At the suggestion of the director of fruitfly control, the president of the board of agriculture and forestry requested me to visit the Kohala district, where the fruitfly has made its appearance. I left Honolulu on February 13, remaining in the Kohala district until February 16, on which day I took a return passage for Honolulu. I have handed the director of the fruitfly control a report on the findings of my visit there.

Respectfully submitted,

EDW. M. EHRHORN,

Superintendent of Entomology.

A copy of the Sugar Industrial World, "devoted to the research of sugar industry and tropical agriculture," as a note to the Forester says, has been received. It is published in Tokio and in itself the periodical is an evidence of the agricultural progress of Japan at home and in her colonies.

STREET TREE PLANTING.

A paper read before The Outdoor Circle, Kilohana Art League, by Ralph S. Hosmer, Superintendent of Forestry, January 30, 1912.

Of the means of civic beautification that lie within the reach

of every community there is nothing that so adds distinction to a town or city as well grown trees along its streets. Whether planted for shade or for ornament, tree lined streets give an air of character and individuality that can be secured in no other way, and not only does street tree planting satisfy merely esthetic ends. It is, if properly done, translatable directly into terms of cash value, for it needs no argument to convince even the most thorough going materialist that a home surrounded by trees and approached through tree lined streets, will, other things being equal, fetch a higher price than a house standing alone in the open.

The following paper deals with certain of the principles that underlie street tree planting and their application. In general these principles are simple and for the most part the reason for applying them is self evident. The planting and proper care of trees are not in themselves difficult tasks. Good common sense and perseverance are the most needed requirements. But it is essential that the several steps in the program be systematically and faithfully carried out if real success is to be attained.

The planting of street trees differs essentially in its purpose from other forms of tree planting. In forest planting, for example, the object is the production of wood or timber or the protection of a water shed. In orcharding, to make the grove yield the most and the best fruit, while along the street the object of the planting is to add to the attractiveness of the street by securing shade or by adorning it with trees beautiful in color or in form.

To be adapted for street planting a tree must have a fairly erect habit, or at least be amenable to being brought into shape through pruning. It must be hardy enough to stand more or less neglect, and it should be of a species that is not continually dropping its leaves, twigs or fruit. Further, and especially here in Honolulu, where within an incredibly short distance natural conditions are decidedly unlike, it is essential that the tree be adapted to the soil and local climate of the immediate locality where it is to be planted.

But before coming to the choice of species there are other considerations that have first to be taken into account. Street tree planting is essentially a matter of coöperation. The first step is to work out a general plan, which, when adopted, shall have behind it interest and support sufficient to see it through. It is obvious that on certain streets trees would be out of place; that on others the requirements are already met by vegetation now growing along the way, within private grounds. Other things being equal street tree planting should begin on residential streets, and, again obviously, it is better to do a little well than to attempt so elaborate a program that the whole thing falls of its own weight.

Practically all the authorities are agreed that in street tree planting the best results both as to effect and as to management are

to be had by using a single species within a given unit of street length. Usually, this unit should include several blocks, both sides of the street. Here again is emphasized the necessity for coöperation.

Because of the many details that have to be attended to in tree planting, many of them requiring some technical skill to carry out, far better results will be got if the work is entrusted to some one body, such as a committee of the local improvement association, rather than if it is left to individuals. In Honolulu we are prone to over-organization. In this matter there is already in existence plenty of machinery. The proper organization to do the active work of street tree planting is the improvement club, backed by the Central Improvement Association, when questions arise that involve territory covered by more than one local club. What is needed now is to bring pressure to bear on the local clubs to have them take up and carry through this class of work. How such influence can best be exerted we need not here discuss, though personally I think that much more would be accomplished by the local improvement clubs, not only in this but in other ways as well, if there were more women members.

Having decided that a given section of a certain street should be planted with trees, the next step is to determine the location of trees, whether in the "parking" between curb and side walk, or within the boundaries of the lots. Much depends on the width of the street, and into the consideration comes, too, the question of where there is likely to be the least interference with the poles and wires of electric companies. We must, of course, recognize that until that happy day comes when all the wires go underground, it is only just that the electric companies have the right to keep their lines clear. But there is a great difference in the way the necessary pruning is done. Some of the foremen exercise care as it is now. Others, unfortunately, do not do so. Under the law the superintendent of public works has the power and authority to grant the right to set poles and to plant trees on the streets, and to make regulations governing the same. The question of how this control can be more strictly enforced is now receiving the attention of the Territorial authorities. But so far as possible it would be well to avoid friction by choosing for street planting those species which will keep below the wires, or by so placing the trees that they will not interfere with them.

Mention has already been made of the desirability in street planting of using trees of upright habit. It is extremely annoying to have low hanging branches extend over the sidewalk, and it is unnecessary, for only those trees should be used that will naturally, or that can be made to assume a proper shape.

Incidentally it may be said that in general the pruning of trees, while not a difficult matter, is one that should receive a larger share of personal attention from the householder than it now does. Every kind of tree has its individual habit. The object of prun-

ing is to assist nature by cutting out interfering branches and encouraging symmetrical development. If a clean cut is made as close as possible to the limb from which the branch is severed, if the work is carefully done so as not to tear down the bark, and finally if the wound is coated with a dressing to keep out fungi and insects,—and for this, ordinary green stain, carbolineum, is as good as anything—a great gain will be made over the senseless “topping” that now goes on in many local grounds regardless of age or kind of tree. In this connection attention may be called to the fact that the staff of the Territorial Division of Forestry, with headquarters at the government nursery, is always glad to give advice as to pruning and other tree work, either there or on the ground, as may best meet the needs of the applicant.

Of the kinds of trees that have successfully been used for street planting in Honolulu, the following deserve special mention: For ornamental effect: Golden Shower, Pink and White Shower, Royal Poinciana, Pepper and Rosewood or Jacaranda. For shade: Monkey pod, Siris tree, Silk Oak, Ironwood and several species of Eucalyptus. Some of the Palms are highly effective but because of their slow growth and need of attention are not so well adapted for street use as for private grounds. This list by no means exhausts the trees that have been and can well be used for street planting in Honolulu. But it will serve for the purpose of this paper.

Seedlings of suitable size for planting of most of the kinds named, except Palms, are kept constantly on hand at the government nursery and are furnished free for street planting. Upon due notice other species will be got ready if it is so desired.

In the planting out of trees the members of the Division of Forestry will be glad to give advice as to details. These are matters that need not be gone into now beyond the general observation that obviously those trees will grow best that receive the most care and attention at the start in the way of preparation of the soil, watering and subsequent protection.

Indeed it is the care given street trees subsequent to planting that determines largely if the result be marked by success or failure. It is easy enough to get people worked up with enthusiasm for an Arbor Day, but it is quite another matter to be sure that there will be some one on the job six months later to see that proper care is being given to the little trees until they become established, and later still to prune them properly, to place and replace stakes, and to give them water in dry times. Because all this is necessary is the reason why street tree planting can be done better by a permanent organization than by an individual or a temporarily appointed committee.

Some few years ago Honolulu was swept by a wave of interest in Civic Improvement which resulted among other things in the setting out of trees on several residential streets in the Makiki district. The start was a good one, but it was not followed up, and

today, in consequence, the streets planted stand more as a reproach and reminder of things left undone, than as they might well have been, avenues of brilliant color that would have been one of the features of the city. It is with no spirit of blame for any individual that this criticism is made, but rather with the hope that the experience so gained may be an incentive to more systematic efforts in the future.

Returning to a matter of detail in street tree planting, one of the most important points to be observed is the proper protection of the little tree by suitable guards. Especially is this true here in Honolulu where small sized seedlings are so generally used, and where on many of our streets it is not uncommon for the street trees to be exposed to cows on their way to and from their pastures.

Taken by and large there is certainly a great opportunity for street tree planting in Honolulu. There is enthusiasm among those who, if they will go about it right, can accomplish wonders. The machinery is already at hand in the local improvement clubs, in the Central Improvement Association and in the special committees of other organizations that can help by bringing the matter to a head in any one locality. There is expert advice to be had for the asking on all technical points and there are free trees waiting to be called for. Everybody is ready for the individual or group of citizens who can start the ball rolling and keep it under way. The result of their labors will be to make Honolulu a pleasanter place to live in, a better as well as a more beautiful city.

REVIEW OF CURRENT LITERATURE.

VAUGHAN MACCAUGHEY.

Principles of Rural Economics, by Dr. Thomas Nixon Carver, Professor of Political Economy in Harvard University. Ginn & Co., Boston. 1911. 386 pp. 5½x8 ins.

This is an authoritative and well-written text. It consists of six large chapters—General Principles; Historical Sketch of Modern Agriculture; The Factors of Agricultural Development; Management in Agricultural Production; The Distribution of the Agricultural Income, and Problems of Rural Social Life. There is no specific mention of Hawaii in this book, but the point-of-view and concise style of the author should engage the attention of any one seriously interested in the welfare of Hawaii's agricultural enterprises. The sketch of modern agriculture is particularly illuminating in its exemplification of the significant economic interpretation of history. The work is true to its title, in that it elucidates the fundamental principles of the subject. The mate-

rial is well classified and ably presented. The book contains an excellent bibliography.

Fundamentals of Agriculture, edited by James Edward Halligan, Chemist in charge, Louisiana State Experiment Station. D. C. Heath & Co., Boston. 1911. 492 pp. $5\frac{3}{4} \times 8\frac{1}{4}$ ins.

A well illustrated text-book on general agriculture, of the type now largely used by secondary schools offering agricultural instruction. There is a brief introduction by Pres. Butterfield, of Mass. The chapters are: The Soil; Plant Life; Manures and Fertilizing Materials; Farm Crops; Trees and the Garden; Plant Diseases; Insects and Birds; Live Stock and Dairying; Feeds and Feeding; Miscellaneous. A unique feature is that "every subject in this book is written by an expert in his line. This idea was carried out in order to furnish the student with the best information that could be obtained." The section on sugar cane, for example, is written by Prof. H. P. Agee, then of the Louisiana Sugar Experiment Station, now of the H. S. P. A. Station. The book is distinctly southern in its point-of-view, and is thus of interest to Hawaii. The accounts of cotton, rice, sugar cane and tobacco, are explicit and well written. Each chapter contains a good set of references for collateral reading. The illustrations are of good quality throughout. The appendix contains a number of useful tables, and suggestions for an agricultural school library. Teachers in Hawaii's rural schools could make good use of this book.

Cultivation of Tobacco in the Philippine Islands, by B. E. Brewer. Philippine Bureau of Agriculture, Farmers' Bulletin 16. 1910. Pp. 23, plates 3, figs. 3.

This is a brief handbook of information for the tobacco grower in the Philippines.

Sisal Hemp in Fiji, by C. H. Knowles. Dept. of Agric. of Fiji. Bul. 1, 1911. Pp. 16, plates 2.

Directions for growing and harvesting sisal, and for extracting the fiber; with statement of results obtained at the experiment station.

Australian Timber; Its Strength, Durability and Identification, by J. Mann. Melbourne. 1909. Pp. xvi-148, figs. 19.

A compilation of data available prior to 1900, relative to the strength and durability of about fifty of the best known engineering and construction timbers of Australia.

The Orange Thrips, by P. R. Jones and J. R. Horton. U. S. Dept. Agric. Bur. Entomol. Bul. 99, part 1, pp. 16, plates 3, figs. 2.

A report of progress for the years 1909, 1910. An important

paper, dealing with an important group of citrus pests. The orange thrips were found, not only on citrus, but also on pomegranates, grape, California pepper tree, dock, pursland, and a wide variety of other plants.

The Unification of Reducing Sugar Methods, (A Correction), by Percy H. Walker, Chief, Contracts Laboratory, U. S. Dept. Agric. Bur. of Chemistry, Circular 82, pp. 6.

Grape Propagation, Pruning, and Training, by George C. Husmann, pomologist in charge of viticultural investigations, U. S. Dept. Agric. Farmers' Bulletin 471, pp. 29, figs. 30.

The Avocado in Hawaii, by J. E. Higgins, C. J. Hunn and V. S. Holt. Hawaii Agric. Expt. Station, Bul. 25, 48 pp., 7 plates, 13 figs. 1911.

This excellent bulletin is heartily welcomed by all in Hawaii who are interested in local horticultural problems. It fills a long-waiting gap in the scant literature of tropical fruit production. The text is well classified and fully illustrated. The main sections are: botany and history of the avocado; natural and cultural requirements; control of insects and diseases; the crop and its marketing; breeding the avocado; the avocado as food; varieties. The sections of particular fulness and interest are those dealing with propagation, marketing, methods of serving, and descriptions of varieties. The blank or form for describing varieties is unusually complete. Of the many Hawaiian varieties, about sixty-five have been described by Mr. C. J. Hunn. Experiments with sprays are now in progress, to control scale (*Psuedococcus*), green caterpillar (*Amorbia*), and fungus (*Gloeosporium*).

The following extract from the introduction illustrates the present market situation, " * * * the growing of this fruit is only an infant industry. For a long time it was impossible to develop it because of the lack of a ready means of rapidly multiplying a good variety and thus establishing the uniformity in product which is necessary in all market fruits. This difficulty has now been removed and development is in progress. There are probably more than 100 acres now planted in orchard in Florida, and inquiries are coming to Hawaii from California for thousands of seeds to start nurseries."

(To be Continued)

RECENT INVESTIGATIONS IN INSECT PARASITISM.

BY OTTO H. SWEZEY

(A paper read before the Agricultural Seminar, College of Hawaii,
February 15, 1912.)

(Concluded)

In the work of introducing parasites from foreign countries, care has always been taken lest hyperparasites be introduced along with them, and thus, if they also became established, lessen the effectiveness of the parasite. It has sometimes been supposed that a parasite thus taken to another country without being accompanied by its native hyperparasites, would be more effective when successfully established in a new place than it was in its native place. The above experience has tended to modify the stand taken on the question of hyperparasites, and it is seen that the benefits to be derived from the exclusion of hyperparasites are not so great as has always been supposed, and the danger from their introduction is much lessened—that is, in cases where there are native hyperparasites which are counterparts of the foreign ones.

With the Tachinid flies that have been introduced, there has been better success. These parasitize the gipsy-moth caterpillars. Nine species have been colonized, some from Europe and some from Japan. Most of these were satisfactorily colonized, and at least two species seem to have become established, while there are good hopes for some of the others.

In the work with the Tachinids, a great deal of new information was gained as to the habits of the different species of this family of parasites. The ordinary method of oviposition for Tachinids has been known for a long time. The adult female deposits her eggs on the surface of the caterpillars; they hatch and the young maggots penetrate the body of the caterpillar to feed upon the fat-bodies, juices, and eventually the vital organs; then, when full-grown, they emerge to pass through the pupal stage in the ground. Among the species studied at the Gipsy Moth Parasite Laboratory, were some that were found to have different habits from that, so a careful study was made of the habits of all of them in so far as possible. Sasaki, a Japanese entomologist, had, about twenty years previously, in studying the parasites of the silkworm, ascertained that a Tachinid deposited its eggs on the leaves. When eaten by a caterpillar feeding on these leaves, they hatched inside the alimentary canal, bored through its walls, and located for a time in ganglia. Later on, they became fixed with the posterior end in close connection with spiracles and feeding on the juices and fat of the caterpillar, eventually killed it.

Among the species studied at the laboratory, this method of oviposition was found, as well as several others. One species was found to deposit living maggots on the surface, another beneath the skin of the host caterpillar; and one deposited living maggots on leaves where they awaited a convenient opportunity to attach themselves to a caterpillar and penetrate its body. There are now known to be these five methods by which young Tachinids gain access to their host caterpillars: host-oviposition; leaf-oviposition; supra-cutaneous host-larviposition; subcutaneous host-larviposition; and leaf-larviposition.

Another matter of great interest was brought out in these investigations—that is, that many Tachinids are physiologically restricted in their host relationships. For instance, if larvae of any Tachinid gained access to a caterpillar in any of the above mentioned ways, conditions might be found such that they might fail to develop, if the conditions, chemically or physiologically, were different from those in their own special host. It is for such reasons probably that many parasites have come to have such intimate correlation with certain hosts that they cannot survive or thrive satisfactorily on any other host. Hence, in the consideration of the introduction of parasites, the most valuable ones would be those that were restricted or closely correlated with the particular host that they are desired for, other circumstances being favorable.

Several Hymenopterous parasites of gipsy-moth pupae have been introduced. One of them (*Monodontomerus*) has become established, and very widely spread throughout the region infested by the Gipsy Moth. Investigations show that it has spread at the rate of ten miles per year. After colonization of this species had begun, it was pronounced a hyperparasite by Dr. Ashmead; colonization was then stopped, even though they were emerging in large numbers from imported parasite material under conditions which pointed toward it being an important primary parasite. Later investigations showed that it was chiefly a primary parasite, even though it was also sometimes a secondary on Tachinids and others. Colonization was again resumed, with the result that it is now the most widely spread of all the parasites that have been introduced. In fact, it has been found spread nearly throughout the infested region. It attacks Brown-tail Moth pupae to a greater extent than it does Gipsy Moth pupae. It has also been found to attack pupae of native moths. As a hyperparasite, it has been bred from Tachinids and from the cocoons of the Braconid, *Apanteles*.

Many of the parasites that I have found so far mentioned, attack both the Gipsy Moth and the Brown-tail Moth. Besides these, other parasites have been investigated and their introduction attempted, which attack the Brown-tail Moth and not the Gipsy Moth. Some of these have been more successful than those on the Gipsy Moth.

It will be seen then that an attempt has been made to secure as many parasites as possible to attack each of the different stages of the moths; and to produce as nearly as possible the same kind of sequence of attack that prevails in the native habitat of these pests—that is, to establish as many as possible of the parasites attacking each of the different stages: egg, larva and pupa.

Summary of parasites introduced or colonized: Egg Parasites, 4 species; 2 species established. Parasites of caterpillar, 20 species; 7 established. Parasites of the pupae, 5 species; 1 established. A total of 29 species, 10 of which have become established.

It was confidently expected that several others would be found established when the time came for making the necessary investigations. Some of them were so recently colonized, that it is not expected that it can be determined yet whether established or not, though some additional ones may have been found established by the investigations in 1911, of which we have no report at hand.

The situation at present is considered satisfactory, but it is expected that five or six years time may yet be necessary before proof is reached as to whether these two pests can be controlled by the introduced natural enemies. In the meantime, plans are being made to continue the introduction of parasite material.

In the course of all this work, many observations of extreme biological significance have been made, particularly with regard to the interrelation of host, parasite and hyperparasite. Some of these have already been mentioned, as for instance the five different methods by which the different Tachinids attack their hosts.

Another interesting habit is in the case of one of the egg-parasites from Japan (*Schedius*). The egg of this parasite is supplied with a long stalk. It is placed within the body of the unhatched caterpillar within the egg of the host, but usually with the end of the long stalk projecting outside the host egg. "When the parasite egg hatches, it does not entirely leave its shell, but remains with its anal end thrust into it, and the stalk which is hollow, becomes functional and acts like a life-line attached to a submarine diver in supplying a connection with the outer air." As the larva grows through its two first stages it retains this connection with the life-line. This is one of the parasites which also act as hyperparasites; for example, if the host egg had already been parasitized and now contained the full-grown larva of that parasite, it would be the victim of this parasite, which in turn might be destroyed by yet another hyperparasite, according to the conditions in Japan where it came from.

A more particular hyperparasite is one, that, having gained access to the body of the host, wanders about in search of any parasites that might be there, apparently not injuring the host,

and not being able to survive unless it finds a parasite larva in which to live.

Another place where a study of the interrelation of parasite and host are being minutely studied is at the laboratory of the Agricultural School at Portici, Italy. Many new and interesting habits are being brought to light. Dr. Silvestri, at this place, has made some most minute investigations of polyembryony. Polyembryony is that method of development by which a large number of embryos is produced from one egg, as occurs with some of the Chalcididae. Dr. Silvestri investigated this phenomenon with *Litomstix*, a parasite of *Plusia*, and a number of other moths. According to his investigations, the process of development is as follows: the adult female parasite deposits one egg in an egg of the moth. It does not destroy the egg as egg-parasites do. It does not interfere with the embryonal development of the host nor the hatching of the caterpillar, nor does it prevent the latter growing to its full size; on the contrary, a parasitized caterpillar attains a somewhat larger growth than a normal healthy one. Returning to the egg of the parasite, a peculiar nuclear division takes place in its development, which results in a segmentation different from usual, by which, eventually, a large number of minute embryos is formed from this one egg. These embryos then feed and grow in the growing caterpillar, not killing it till after it has become full-grown and spun its cocoon; when they soon finish their growth, having eaten the entire contents of the caterpillar skin which they entirely fill, giving it the appearance of being crammed full and stretched beyond the normal size. These parasite larvae pupate in this position, and in due time the adults emerge to the number of several hundred, even thousands. As high as 3000 has been reported as produced in this way in one caterpillar, and all having originated from a single egg. This method of development is known for a number of parasites. We have in the Hawaiian Islands a parasite on native wasps which probably reproduces in this way, though the details of it have not been worked out for this species.

Some mention should be made of the investigation of parasites in connection with the cotton boll weevil in the Southern States. No parasites have been obtained from foreign countries, but in the study of the native parasites, 26 species have been found attacking the boll weevil. These sometimes have been found killing quite a good percentage of the weevils, and thus becoming one of the important factors in their control, in 1909, producing an average destruction of 16 per cent. A good deal of work has been carried on in distributing the more efficient of these parasites from one place to another in Texas, and also to those places in Louisiana and Mississippi to which the weevil has spread.

Considerable experimenting has also been done in the transfer

of *Aphis* parasites from southern points, into Kansas wheat fields, for the destruction of the spring grain aphid or so-called "green bug," that made such severe outbreaks a few years ago, particularly in 1907. Definite results have been prevented by the occurrence of the parasite throughout the range of the destructive insect, parasitic as it is upon other species of plant lice. It could not always be determined definitely whether the parasites might not have come from this source to the wheat fields and had accomplished as much or more good than those which were brought from a distance.

Recently an egg-parasite has been introduced from Europe for the eggs of the elm leaf-beetle in the Eastern States; and attempts are being made to introduce parasites for the alfalfa weevil in Utah, and the "white fly" in Florida. From the United States parasites are also being sent to other countries, for different pests. I mention these few out of many similar investigations, as evidence of the amount of this kind of work that is being done.

I should not close without dwelling a little upon one of the latest feats in parasitic work here in Hawaii, though you no doubt are mostly already familiar with the facts. I refer to the introduction of the Tachinid fly from New Guinea, by Mr. Muir. This is a parasite on the sugar cane borer, a pest known to exist in these Islands for about half a century. Mr. Muir was engaged in searching for parasites for this weevil for two years before discovering any. After searching such regions as Fiji, Southern China, Malay States, Java and Borneo, he finally discovered this Tachinid at Amboina, one of the islands of the Malay Archipelago, between Boreno and New Guinea. All attempts to transport it from there to Honolulu failed. On further search, the same parasite was found in New Guinea. From there, overcoming many difficulties, it was finally successfully received in 1910 in Honolulu, via Australia and Fiji, in which places colonies were reared to send on the next stage of the journey.

From the time the parasites arrived safely in Honolulu, they have been successfully reared in cages, continually to the present time, and colonies distributed to all sugar cane districts of the Islands. Nearly all of the sugar plantations have already been supplied with them; and on those where first established, they have already become widely spread, in but little more than a year's time. The prospects are very favorable of their becoming a considerable help in checking this very destructive cane pest.

This Tachinid presents still another method of reaching its host, different from the five methods previously mentioned, by which the different species attack caterpillars. Briefly, this borer Tachinid deposits her eggs (and sometimes maggots instead) in the minute openings in the rind of the cane produced by the borer larvae coming close to the rind while eating inside the cane. The tiny maggots wander about in the channels produced by the borers in the cane, on finding a borer larva, pene-

trate it, living inside, feeding on the fat-bodies of the host, finally killing it. The death of the host does not take place usually till it has constructed its cocoon; then the one or more parasite maggots emerge from it and form their puparia within the cocoon of the host, from which the adult parasites emerge in due time. We have here a parasite with habits perfectly correlated with its host. One that will probably not attack any other species of insect, unless perchance a different species of weevil, in sugar cane, should any exist.



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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughe, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHREHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

MAY, 1912.

No. 5.

MANILA MOSQUITO CAMPAIGN.

The following appears in the report of the Philippine bureau of science for the past year. It shows that "everlastingly at it" is the price of success in war upon this great insect pest of man and beast:

"In the month of August, 1910, after a thorough canvass of the field, a plan was suggested to the Director of Health, whereby a temporary antimosquito brigade might be established looking toward the eradication of the brown mosquito, *Culex fatigans* Wied., in the city of Manila and incidentally the lessening of the day mosquito, *Stegomyia persistans* Banks.

"The work was not permanently organized until February, 1911, since which time we have been receiving the coöperation of the Bureau of Health and the Municipal Board of Manila. It is safe to state that the brown mosquito practically has been exterminated in Manila. It is now almost impossible to secure specimens of it for experimental purposes.

"It is believed that this is the most serious mosquito pest we have, but it can not be denied that, occasionally and for limited periods, other mosquitoes might breed, if conditions favorable to them were provided. This has been more than strikingly borne out recently by finding *Culex microannulatus* Thoebl., another vicious biter, breeding in artificial pits, ponds, and pools created in the process of construction going on at the new fill on the water front and other work of improvement and beautifying in the city of Manila. This mosquito, like the brown one, has distinct and peculiar habits and can be kept down if one branch of the government will coöperate with another in preventive measures.

"The work of eradication was somewhat crippled when the American sanitary inspector in charge of it went to the United States on leave. It can readily be understood that, unless this work is continuously and steadily pushed under the supervision

of intelligent sanitary inspectors, there will be a gradual reintroduction of *C. fatigans* and a return to previous conditions. A steady campaign, looking to the permanent eradication of insanitary breeding places in homes and adjacent premises, should be carried along with the work of inspection and oiling. However, it is generally the custom, if mosquitoes return, to argue that the observed facts regarding their life-history are wrong, rather than to look to careless oiling or the lack of discovering insanitary spots as the cause. The expense of mosquito extermination is not great, but the work must be thorough.

BEES AND SPRAYING FRUIT TREES.

In connection with recent discussions in the local newspapers on this subject, the following article, clipped from the *Agricultural Gazette* of New South Wales is interesting:

In the *Victorian Journal of Agriculture*, Messrs. E. E. Prescott, principal of the Horticultural School, Burnley, and F. R. Beuhne, bee expert, report an experiment to ascertain whether there is any danger to bees by spraying fruit trees with poisonous mixtures whilst in bloom. The following extract summarizes the results:

"At the Burnley Apiary, the bee-hives are right under the fruit trees, and at the time of spraying with Bordeaux mixture the ground had not yet been plowed, so that the spray fell not only on any fruit blossoms which were open, but also on the Cape weed then abundantly in bloom.

"Neither the spraying with Bordeaux mixture nor the subsequent one with arsenate of lead had any effect whatever upon the bees, the colonies developing normally, and without any check; there was not at any time dead brood in the hives. There is no doubt that under the atmospheric conditions prevailing at the time the spraying of the trees proved quite harmless to bees. Observations will, however, be continued in future, to demonstrate whether spraying is injurious to bees at all; or if so, under what conditions."

RABIES IN THE PHILIPPINES.

In view of the opposition, at least temporary, to the quarantining of dogs against the introduction of rabies into Hawaii, the following extract from the tenth annual report of the Bureau of Science of the Philippine Islands, is of interest:

"*Rabies*.—Since the departure of Major E. R. Whitmore of the Medical Corps, United States Army, who was detailed for work in this laboratory, the work relating to rabies was carried on in the serum laboratory. Since August 1, 1910, 24 dogs were

submitted for examination. In 21 of the 24 dogs Negri bodies were demonstrated.

"Forty-eight patients who had been bitten by rabid or supposedly rabid dogs were given the Pasteur treatment, and at the present time all are well. Glycerinated cord was sent out for 6 patients and the treatments were given by local physicians. One of these out-patients, who is said to have received the complete treatment which ended January 26, 1911, is reported as having died of rabies February 7, 1911."

The receipt is hereby acknowledged of the tenth annual report of the Bureau of Science (Philippines) to the Secretary of the Interior. It shows that the body named covers a wide range of investigation, including the pestilential diseases of mankind. There is a melancholy interest attaching to this report of the bureau, as it was issued under the authorship of Dr. Paul C. Freer, director, whose untimely death has lately been reported.

During the past year the herbarium of the Philippine bureau of science received from the Bernice Pauahi Bishop Museum of Honolulu 200 Hawaiian plants and sent to the same institution 312 plants. In the same period the bureau has arranged for exchanges with the department of agriculture and forestry of Hawaii.

DIVISION OF FORESTRY.

REPORT FOR MARCH.

Honolulu, April 4, 1912.

Board of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen: I have the honor to submit as follows the report of the division of forestry for the month of March, 1912.

Forest Reserve Matters.

During this month a considerable portion of my own time has been occupied with the checking up of data pertaining to the preparation of reports on several pending forest reserve matters. Two of these reports are now almost ready to be submitted to the board.

On March 20, in company with Mr. L. L. McCandless, I visited the government land of Makua, on this island, because of a question having to do with the forest reserve boundary, and on the 21st, with Mr. Kahookele of the government survey office, made a provisional location on the ground of a forest line across the mauka end of the government land of Kuokala. Reports on these projects will be made to the board when the maps are ready.

Forest Extension.

With the approval of the board a readjustment has been made, to take effect April 1, of the money allotted to the sub-nurseries maintained by this division at Hilo, Hawaii and Homestead, Kauai, whereby work at the former station is somewhat curtailed and that at Homestead correspondingly expanded. At the latter nursery the additional money will be used particularly for the planting out in the experimental garden at Papapaholahola of a considerable number of plants newly introduced to the Territory, that have been propagated at our station in Makiki Valley.

Just at present the demand for trees at the Hilo nursery seems to be slack, though Bro. Matthias Newell reports that for the period from January 1 to March 23, 1912, 1530 trees were given out from that nursery. In addition to this, some 1500 Japanese cedar trees, in boxes, have been forwarded from Hilo, via Honolulu, to Kona, Hawaii, where with an additional lot from Honolulu they are to be planted out by the manager of one of the coffee companies.

Advice and Assistance.

A valuable point of the work of the division of forestry is the giving of advice to persons desiring information as to the growing and care of trees. Calls of this character take up not a little of the time of the forest nurseryman. During the past month, in addition to answering inquiries made at the office, Mr. Haughs has visited a number of places about the city and given practical suggestions to a committee from the Kilohana Art League now actively interested in street tree planting.

Mr. Haughs' report, transmitted herewith, gives details in regard to the plants distributed during the month.

Return of Mr. Rock.

On March 30, Mr. J. F. Rock, consulting botanist of this board, returned to Honolulu from a field trip of nearly three months to Hawaii and Maui. Having visited several localities of botanical interest not previously known to him, Mr. Rock brings back much new herbarium material, besides many notes and photographs that will be of great value in future work.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

NURSERYMAN'S REPORT.

Honolulu, March 31, 1912.

R. S. Hosmer, Esq., Supt. of Forestry, Honolulu.

Dear Sir: I herewith submit a report of the principal work done during the month of March.

Distribution of Plants.

	In seed boxes.	In boxes transplanted.	Pot grown.	Total.
Sold	9,000	100	1,864	10,964
Gratis	5,000	800	123	5,923
	<u>14,000</u>	<u>900</u>	<u>1,987</u>	<u>16,887</u>

Collections on account of plants sold amounted to	\$20.30
For eucalyptus trees from Tantalus	5.00
From division of animal industry for manure sold	\$4.00
For use of animal quarantine station	1.00 5.00
Total	\$30.30

Plantation Companies and Other Corporations.

We have not received any orders for plants but we have delivered 4000 ironwood (*Casuarina equisetifolia*) in boxes transplanted during the month.

Experiment Garden, Makiki.

The men at this station have been busy transplanting seedlings, preparing soil and doing other routine work.

U. S. Experimental Planting, Nuuanu Valley.

The two men have been hoeing and clearing away grass from the trees, also assisting in the planting of more trees. One day was spent by all the men that could be spared from Makiki and the nursery in the planting of more trees.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

REPORT FOR APRIL.

Honolulu, May 3, 1912.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I have the honor to submit as follows the routine report of the division of forestry for the month of April, 1912:

During the first half of this month my own time was largely taken up with matters in connection with proposed forest reserves on the Waianae range, Oahu, and in the Kula district, Maui, and in the preparation of a brief report of the work of the division of forestry for the year 1911, for the use of the members of the board.

In this connection it may be of interest to note here the number of seedling trees given out from division of forestry nurseries during 1911. The list is as follows:

FROM THE GOVERNMENT NURSERY, HONOLULU.

Regular Division.

In seed boxes.....	195,250
In transplanted boxes	23,613
Pot plants	29,533

Special Plantation Orders.

In seed boxes	338,000
In transplant boxes.....	11,000
<hr/>	
Total	597,396
From the Hilo Nursery.....	12,104
From the Homestead, Kauai Nursery.....	11,239
<hr/>	
Grand total	620,739

TRIP TO MAUI.

From April 23 to April 30 I was on the Island of Maui, engaged in making an inspection of forest planting in localities in which the Territory has a more or less distinct interest.

At Wailuku I arranged with Mr. H. B. Penhallow, manager of the Wailuku Sugar Company, details in regard to the planting of a portion of the government land of Polipoli, set apart last year as a part of the West Maui forest reserve. I also had a general look at the planting which the Wailuku Sugar Company has been carrying on on its private lands on the lower slopes of the hills above its cane fields, back of Wailuku. The notable thing here is the excellent start which both ironwood and eucalyptus seedlings, planted out over a year ago, are making on the bare, eroding slopes, especially on the south side of Iao Valley. Not only are the little trees doing well but small as they are, leaves and forest litter are already beginning to collect under them, helping to hold the soil in the little gullies and check the damage from wash. This is work of high value which cannot but repay the plantation company in years to come. In addition to the strictly protective belts, Mr. Penhallow is also doing considerable planting on algaroba and eucalyptus with the object of securing a fuel supply for the plantation. In all 11,400 trees were planted at Wailuku in 1911.

In the Koolau District.

Next I spent several days in the Koolau district carefully going over the forest planting work now in progress along the ditch systems controlled by the Alexander & Baldwin interests. This planting, for the most part on government land, is being done

jointly by the Hawaiian Commercial & Sugar Company and the Maui Agricultural Company, under a plan drawn up by me last autumn. The general purpose of the planting is to establish shelter belts to assist in the return of the native forest on areas where large numbers of trees died a few years since and to start stands of thrifty trees in places now without useful vegetation.

Under the general direction of Mr. W. F. Pogue, the work is in charge of Mr. W. E. Saffery. Since October last some 14,000 trees have been set out, principally eucalyptus, of species that have been shown by experience to do well in the wet and exposed locations where the planting has to be done.

It is encouraging to note that the native Hawaiian forest shows every indication of recovery. There has apparently been no setback since the trees started to grow again and undergrowth of certain desirable kinds is considerably more in evidence now than it was a year ago when I visited Koolau.

Plans for continuing the planting and for further assisting the return of the native vegetation were discussed in detail on the ground with the men in charge. Now that the work has been got well under way progress will be more rapid, but the record for the last six months is a decidedly satisfactory one.

Forest Planting at Kailili.

On my return from Kailua I stopped for a day with Mr. Waldemar Hannestad at Kailili, particularly to arrange with him about the planting of a portion of the Makawao forest reserve, a government land. This work is being done under an agreement made some two years ago with the Maui Agricultural Company whereby trees are being planted in return for the right to remove dead wood. On the fee simple lands of the Maui Agricultural Co. at Kailili, Mr. Hannestad has this winter planted out about 170,000 seedling trees. Unusually cold weather has retarded the growth of trees all over Maui but with the coming warm months the trees set out will grow rapidly. For several years now the Maui Agricultural Company has planted about 100 acres of forest a year at Kailili, principally *Eucalyptus globulus*, and *E. robusta*, and Japanese Cedar. For the most part the trees are set 5x5 feet, or 1750 to the acre, thus making a close stand. The purpose is to produce timber and wood. A fine forest is being produced.

Other Forest Planting Projects.

Of other tree planting projects in progress on government land I am glad to report that the planting of the Kohala mountain above Waimea village is going ahead well. Dry weather during the late fall and early winter delayed planting, but in the last two months many trees have been set out. Mr. A. W. Carter reports that but very few indeed of the trees planted last year died during the winter. Considering the adverse conditions of

soil and situation and the unfavorable weather, this is extremely encouraging. The area required to be planted is now practically completed, but the Parker Ranch is continuing the work by extending the block of planted forest over its own adjoining fee simple lands.

Under the tree planting contract with Mr. C. G. Owen, recently made for Pupukea, Oahu, the first installment of trees went out from the Government Nursery early in April. These are to be used as a windbreak on the edge of the gulch adjoining the area to be planted in pineapples and later with trees.

Under the provisions of government leases requiring such work, tree planting is going forward on government land at Kukaiau and Upper Paauhau, Hawaii, and at Kula, Maui. From all three of these places satisfactory reports have recently come in.

This year the demand from plantation companies for seedling trees has continued later into the spring than is usual. Several considerable orders were placed in April. The details are given in Mr. Haughs' report.

Experimental Work.

Thro' the courtesy of Hon. A. de Sousa Canavarro, Consul for Portugal, the division of forestry received some time ago cuttings of basket willow. These were propagated at the experimental garden in Makiki Valley, and in April enough shoots were cut to make a half dozen good-sized baskets and hampers. This work was done by a Portuguese laborer skilled in basketry. There are no cuttings ready for distribution as yet, but next year a considerable number of persons can be supplied. There seems no good reason why in time basket making in Hawaii should not become an industry employing a goodly number of persons. This project is past the experimental stage. It is simply a question of how fast the parent plants can be made to reproduce.

Official notification has just been received from the Federal forest service, Washington, that for the fiscal period from July 1, 1912, to June 30, 1913, the sum of \$500 has been allotted for continuing experimental tree planting in Hawaii. Allotments from the forest service have now been received for several years. At first all the money was spent in planting temperate zone conifers on the higher mountains. Many of the results here, as was to be expected, were negative, but on the showing made Mr. H. S. Graves, the Federal forester, says in a letter dated April 4, 1912: "The reports show that careful and thorough work has been done and that successful methods of reforestation adapted to the various sites where tests are in progress will undoubtedly be developed. I am much pleased with the showing made and the results which you have accomplished with the expenditure of forest service funds for developing reforestation methods adapted to Hawaii."

Last year a plantation of certain species of eucalyptus new to Hawaii, considered to be of economic value, was started in Nuuanu Valley with a part of the money.

Considering that the forest service appropriations were very materially cut this year by Congress, the fact that the allotment for Hawaii was continued is significant of the importance that is attached to this type of work by the forest service. For the coming period it is proposed to expend the forest service money in continuing the work on the high mountains and in extending the eucalyptus plantation in Nuuanu.

Forest Fire Notes.

On the afternoon of April 11, members of the division of forestry staff responded to a call for a grass fire on the slope of Punchbowl. On the evening of April 30, Mr. Haughts hastened to Kalihi Valley on a report of a forest fire there. Fortunately this report proved to be unfounded.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF THE FOREST NURSERYMAN.

The following report gives the principal work done during the month of April:

NURSERY.

Distribution of Plants.

	In boxes transplanted.	Pot grown.	Total.
Sold	900	2,773	3,673
Gratis	4,749	3,731	8,480
	<hr/> 5,649	<hr/> 6,504	<hr/> 12,153

Collections.

Collections on account of plants sold amounts to	\$18.80
From division of animal industry for extra quarantine expenses	3.00
	<hr/> \$21.80

Plantation Companies and Other Corporations.

From the stock raised with labor supplied by plantation companies and other corporations we have received orders and supplied the following plants:

In seed boxes.	In boxes transplanted.	Pot grown.	Total.
7,000	3,550	3,103	13,653

Collecting of Seed.

The two seed collectors have been collecting seed, in and around the city, of a number of species of forest and other trees. The seeding season for most of the forest trees is just commencing.

Alarm of Fire in Kalihi Valley.

On the evening of April 30, a message was sent from the police station stating that they had received a telephone message from Kalihi Valley notifying them that a fire was raging in the brush. The writer, along with Manuel Freitas, the stable man, drove up to the top of the Valley road but there was no fire to be seen. We found out that some Japanese working on Mr. Francis Gay's place had been burning brush in the afternoon which was probably the cause of the alarm.

Experiment Garden, Makiki.

The work at the garden has been principally transplanting and potting trees. Two of the men employed for the purpose of raising trees for plantation companies and other corporations were discharged at the end of the month owing to the want of money in this fund to carry on the work. One man will continue to do this work during the month of May; at least, enough money being left to pay the wages of one man.

U. S. Experimental Planting, Nuuanu Valley.

At the end of March one man was discharged, leaving one to do the hoeing and care of the trees. More trees will be planted during the month of May.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, April 8, 1912.

Hon. Wm. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir: I have the honor to report on the work of the division of animal industry for the month of March as follows:

Bovine Tuberculosis Control Work: As will be seen from the appended itemized report of the assistant Territorial veterinarian more than 4000 head of dairy cattle have been tested, with the highly gratifying result that only 139 head reacted

to the test, that is, were found to be infected with tuberculosis. Without exception the owners of these infected animals have taken steps for their immediate segregation and ultimate disposal for slaughter, no reacting animal, so far as can be ascertained, being left on premises from which milk is produced. It seems now to have become a well established rule for all milk consumers here to look into the source and origin of the milk served at the table or used in the household, and to inquire diligently of the vendor or dealer: "Have your cows been tested, and are they free from tuberculosis?"

As every milk producer is well aware that his answer to these questions can be verified in a moment by calling up this office on the telephone, there is little to be gained by evading the truth, and the fact is that many inquiries are being received by the officers of this division in regard to the state of health of the dairy animals, as well as of the hygienic and sanitary conditions under which milk is being produced by various dairymen. In replying to such inquiries it has been made a rule not to discriminate or to draw lines as to whose milk is produced under the most satisfactory conditions, but if a dairyman neglects to clean up his herd by removal of reacting animals or if he fails to disinfect after such removal, or in other ways commits or forgets to provide improvements, when requested to do so, the facts will soon reach his customers, at least those who insist upon having clean milk from healthy animals.

The rule established by the Honolulu Dairymen's Association to refuse absolutely to receive or in any way handle the milk from dairies where reacting animals have been retained, or even where untested animals are kept, has had a salutary effect on the entire local dairy industry, and obverse or contrary reports notwithstanding, it must be admitted that the dairymen of the city and county of Honolulu have responded most admirably in their concerted effort to suppress this most destructive and dangerous of all scourges—animal as well as human. The report of this division for the month of September, 1910, when the first annual tuberculin test of the dairy herds of the city of Honolulu had just about been finished, shows 556 reactors out of 1715 animals tested, or 32.42 per cent. The present test of the same herds, those of the city alone, shows 1761 animals tested with 94 reactors or 5.34 per cent. This latter figure is, however, somewhat misleading as it is unproportionately influenced by the number of reactors in one herd, where little or no effort has been made to stamp out the disease, and where no less than 76 reactors were found among 138 animals. If this one herd is eliminated in calculating the results, we find that the percentage of reactors is only 4.77 for the city and 2.89 for the city and county. In regard to the number of dairies in which the disease was found, more

than 90 per cent were found to harbor the infection when first tested, while nearly 80 per cent were found to be clean by the present test. Besides this highly gratifying result, every owner of reacting cattle has either already sent the infected animals to be destroyed or has promised to do so at the earliest possible opportunity. Even the one herd with the twenty-six reactors was cleaned out the same day the result of the test was reported to the owner. It should be mentioned that every reacting animal is plainly branded, and as nearly every dairyman has had that same brand applied to one or more of his own animals during the past two years, it is not likely that there is anybody left who does not know the brand when he sees it, and is hereby protected against purchasing or admitting to his premises, or tolerating on adjoining premises a tuberculous animal.

The fact that tuberculosis among the local dairy herds has been immensely decreased is further demonstrated by the fact that out of the 139 reactors found by the last test only two or three showed physical symptoms of the disease. All of the rest of those which have been killed so far showed on post mortem examination but very slight lesions, so slight in fact that it is very doubtful whether the affected animals could possibly have transmitted the disease to other animals in their immediate neighborhood or surroundings. Two of the physically affected animals were family cows, which had never been tested before. Unfortunately there seems to be a definite conviction in the public mind that the family cow, or the cow from which no milk is sold, need not be tested. It can therefore not be too strongly emphasized that the untested family cow is an extremely dangerous animal to obtain your milk supply from, especially in view of the fact that the tuberculous cow often is a heavy milker and that even the advanced stages of tuberculosis does not change the appearance or taste of the milk.

Not until the disease has spread to the udder and is destroying the milk gland itself, does the appearance of the milk indicate the presence of the disease in that organ, while for weeks before that stage is reached the milk contains millions of virulent tubercle bacilli, even though retaining its normal appearance. When to this is added that the milk from the family cow generally is consumed undiluted or unmixed with the milk from other cows, it becomes imperative that this cow, of all, should be the first one to be tested, especially where children are fed the milk.

Section one of the local Milk Ordinance further states that: "No milk producer shall offer for sale or deliver for sale, **use** or **consumption**, any milk without first having obtained from the board of supervisors a permit to do so." That certainly makes it plain that a permit must be obtained whether the milk is sold or given away so long as it is consumed and as no per-

mit can be granted unless the cow has passed the tuberculin test, it would seem that some of the owners of family cows, who do not sell milk, are violating the milk ordinance, even though unwittingly.

The intradermal method of testing has been employed exclusively and has given absolute satisfaction not alone to the operator but, on account of its simplicity, to the dairy owners also. The fact that the owner can see for himself whether an animal reacts or not has made this form of testing very popular, and numerous post mortem examinations of reactors have convinced us that as a diagnostic agent, the method is just as reliable as the subcutaneous method, and vastly easier of application and interpretation.

The Quarantine Station: The installation of the kennels has been finished and the first occupants, a family of six Japanese spaniels, were received by the S. S. Manchuria on March 25.

As several outbreaks of rabies have occurred in San Francisco of late, it would seem that the quarantine of dogs on account of this disease was a well advised step. The measure has met with considerable criticism, most of which has been based on either ignorance or misinformation as to facts and has been easily refuted. The cost of feeding the family of six now at the station has averaged about 30 cents per day, but this will undoubtedly increase as the pups grow up. The entire cost of construction of the kennels and keeper's quarters has been \$884.07 up to date as per itemized statement herewith appended.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

TUBERCULIN TEST OF DAIRY CATTLE, CITY AND COUNTY OF HONOLULU, 1912.

	Tested.	Passed.	Condemned.
Wm. Gomes	10	9	1
J. H. Cummings.....	5	5	0
D. P. R. Isenberg.....	337	312	25
Marshall & Azevedo.....	28	26	2
P. M. Pond.....	37	36	1
M. Gomes	28	28	0
H. B. Brown.....	13	13	0
S. J. Grace.....	5	5	0
Capt. Hartman	3	3	0
J. E. Faria.....	20	20	0
R. Compos	12	12	0
Frank Gouveira	24	24	0
J. Quintal	2	2	0
J. M. Whitney.....	10	9	1
T. F. Farm	45	42	3
Omai Tatsuichi	10	10	0

	Tested.	Passed.	Condemned.
F. C. Krauss	1	1	0
K. Inouye	8	8	0
W. P. Alexander	5	5	0
I. Nagaki	15	15	0
J. H. Cummings	4	4	0
Mrs. C. M. White	10	9	1
Frank Medeiros	12	12	0
P. Miyakawa	13	13	0
J. Allencastro	7	7	0
K. Yamashita	7	6	1
S. Hiarata	14	14	0
C. K. Quinn	6	6	0
Chas. Frazer	1	1	0
College of Hawaii	15	15	0
H. E. Cooper	15	15	0
Frank Andrade	81	80	1
Kawaiahao Seminary	15	15	0
Mrs. Mary Quintal	8	8	0
S. Tsumoto	9	9	0
M. Kawamura	6	6	0
Mrs. W. W. Hall	1	1	0
G. L. P. Robinson	5	5	0
Frank Valph	6	6	0
Chas. Bellina	138	112	26
S. de Nobriga	13	13	0
Oahu College	12	12	0
Manuel Abreau	3	3	0
John Rezants	13	13	0
C. J. Day	5	5	0
Geo. Wond	18	18	0
Antone Pires	8	8	0
Geo. Holt	37	35	2
Kamehameha Schools	44	42	2
W. E. Miles	17	16	1
Frank Correa	13	12	1
Mrs. Mary Riedell	10	9	1
Victornia Souza	35	33	2
Alexander Young Dairy	46	46	0
Desidero Tello	2	2	0
John P. Mendonca	10	10	0
L. C. Fernandez	8	8	0
J. G. Silva	4	4	0
A. Wilder	2	1	1
Richard Kapena	2	1	1
A. Tavash	3	3	0
Mrs. E. Johnson	2	2	0
S. M. Damon	148	143	5
Galt & Carter	13	13	0
M. Ota	1	1	0
Chas. Bellina	28	28	0
Chas. Lucas	90	80	10
S. M. Damon	182	178	4
P. M. Pond	327	317	10
O. R. & L. Co.	1403	1390	13
Y. Ogawa	4	4	0
J. A. Templeton	37	35	2
Laie Plantation	16	15	1
Industrial School	48	48	0
F. S. Lyman	17	17	0
E. K. Elsworth	1	1	0

	Tested.	Passed.	Condemned.
J. Coonradt	3	3	0
Waianae Ranch	292	186	6
P. Isenberg	129	116	13
Total	4037	3898	139—3.47%

ASSISTANT VETERINARIAN'S REPORT.

Honolulu, April 8, 1912.

Dr. Victor A. Nørgaard, Chief of the Division of Animal Industry, Bureau of Agriculture and Forestry.

Sir:—I have the honor to submit herewith a report of the work accomplished during the month of March.

Tuberculosis Control.

During the past month the following dairies have been visited and the stock tested, viz :

Date.	Owner.	T.	P.	C.
March 2-4.	A. Wilder	2	1	1
	Richard Kapena	2	1	1
	A. Tavash	3	3	0
	Elmira Johnson	2	2	0
" 4-6.	S. M. Damon	148	143	5
	Galt & Carter	13	13	0
	M. Ota	1	1	0
	Chas. Bellina	28	28	0
" 5-7.	Chas. Lucas	90	80	10
" 9-11.	S. M. Damon	182	178	4
" 13-15.	O. R. & L. Co.	341	336	5
" 14-16.	"	376	375	1
" 18-20.	"	441	433	8
" 19-21.	"	245	245	0
" 23-25.	P. M. Pond	243	240	3
" 25-28.	"	83	77	7
" 26-28.	Y. Ogawa	4	4	0
	J. A. Templeton	37	35	2
	J. Coonradt	3	3	0
	F. S. Lyman	17	17	0
	E. K. Elsworth	1	1	0
	Industrial School	48	48	0
	Laie Plantation	16	15	1
" 27-29.	Waianae Ranch	292	286	6
" 30.				
April 2.	D. P. R. Isenberg	129	116	13
		2748	2681	67

Livestock importations at the port of Honolulu since February 29, date of last meeting, are as follows:

S. S. Lurline, Mar. 13, 1912—8 mules, 4 horses, C. Brewer & Co.; 10 horses, Mr. Murphy; 1 ct. birds, Wells Fargo Ex. Co.

S. S. Sierra, Mar. 15, 1912—15 cts. poultry.

S. S. Wilhelmina—2 cts. poultry.

S. S. Manchuria, Mar. 25, 1912—6 lap spaniels, T. Shiwara (quarantined).

S. S. Virginian, Mar. 29, 1912—4 mules, A. M. Dept.; 1 antelope, Geo. Rodiek.

S. S. Tenyo Maru, April 4, 1912—2 cts. Japanese games.

S. S. Sierra, April 5, 1912—19 cts. poultry.

Respectfully submitted,

L. N. CASE,
Asst. Territorial Veterinarian.

DOG QUARANTINE STATION.

Honolulu, April 24, 1912.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry,

Honolulu, T. H.

Sir: For the purpose of obtaining an allotment of \$1,000 for the use of the division of animal industry in enlarging and improving the premises, quarters and equipment now available for the quarantining of dogs arriving here from the mainland of the United States and other countries where the disease known as rabies or hydrophobia exists, or, in other words, for enforcing and effectively carrying out the provisions of Rule VI of this division, I have the honor to lay before you such facts and conditions as have developed during the short period since the promulgation of the said Rule, and which, in my opinion, makes it imperative that such appropriation should be made without delay.

That rabies is rampant among dogs in San Francisco cannot be denied. We learn from the daily papers of that city that at the inquest on the body of a man who recently died from hydrophobia, having been bitten by his pet terrier some five weeks previously, the verdict of the coroner's jury recommended that the dog muzzling regulation recently enacted by the board of supervisors be strictly enforced, while the pound-master reports 1011 head of unlicensed dogs caught and destroyed during the month of March "because of the numerous recent cases of dog bites." That only one case of hydrophobia in man has been reported so far is undoubtedly due to an effort on the part of the authorities to suppress the facts. Under date of March 18th the federal inspector in charge of the port of San Francisco writes me, referring to the prevalence of hydrophobia: "A few days ago we had a case in my own neighborhood where four or five dogs were found to be rabid and over a dozen people had been bitten by them."

As this is the first time that an epidemic of rabies has occurred in San Francisco it may be taken for granted that the efforts of the authorities to combat the disease is being met with the usual obstructions of the skeptic and the ignorant. This is evidenced by the published facts that the first human victim was ridiculed and told not to worry, when he presented himself for treatment and expressed his fears of hydrophobia. It is therefore safe to conclude that numerous cases are being kept away from the authorities until they develop either the furious or the paralytic form of the disease, that is, until they have done all or most of the harm they can do by transmitting the disease to man or beast, and the epidemic is therefore bound to increase in extent as well as in number of cases, as is invariably the fact in newly-invaded territory, until the public becomes educated through bitter experience to the necessity of coöperation with the authorities in suppressing the disease. And that is exactly what is going to occur here if a single infected animal should gain entrance to the Territory and develop the disease before apprehended. For this reason it has been forcibly impressed on me of late that we must do everything possible to gain the confidence and coöperation of the public and especially of incoming tourists or returning residents who are accompanied by dogs. Every dog owner is as a rule a dog fancier or a dog enthusiast and nothing is more objectionable, not to say horrible, to such as the idea of having the canine pet, pal or companion put in quarantine, something on a par with having a member of the family confined in the state prison. This, in connection with the unfortunate length of the quarantine which the nature and course of the disease makes imperative, suggests that the premises where the animals are to be confined be made as comfortable and attractive as possible in order to make the prolonged segregation resemble imprisonment as little as possible and thereby induce the owners to comply with the requirements of the law instead of trying to evade them.

With these facts in mind I have planned and built the present quarantine kennels, in so far as the funds allotted for the purpose have allowed. Attractiveness and comfort had, however, to yield to hygiene and space, and these two most important requirements for a modern sanitary quarantine station were provided to the utmost extent possible with the means at hand. On the basis of the average arrival of dogs in the Territory for the past few years, and estimating that the quarantine regulation would halve this number, it was suggested to the board that provision be made for the segregation of twenty-four dogs at any one time, which would limit the admission of dogs into the whole Territory to seventy-two head per annum, or considerably less than half the usual number. In the opinion of the board, however, the quarantine regulation

would practically put a stop to the importation of dogs, and provision was made for only **twelve** kennels. At the present writing there are fourteen dogs in quarantine, with less than half of the first four-month quarantine period gone, and three more dogs, which are known to have been shipped, may arrive at any time. That will tax the station to its utmost capacity as the animals cannot, as a rule, be doubled up without prolonging the quarantine period for the original occupants of a given kennel, as all the animals in one kennel must remain until the last one has finished the four months' time of segregation, which will compel the first occupant of the kennel to remain five months in quarantine.

In regard to the present equipment of the kennels the past month has demonstrated that shade by means of flies or awnings must be provided. All of the long-haired dogs are suffering from the heat and are continually endeavoring to relieve this condition by digging themselves down into the sand. Some of the owners have provided a tent fly for the kennel in which their dogs are confined, with the result that all the other owners have demanded that such flies be provided for their dogs. As this demand in my opinion is only reasonable I would suggest that funds be allowed for this purpose. The dogs in the unprotected kennels are panting badly during the entire day and as summer is approaching the condition will naturally get worse. For the same purpose—keeping the dogs cool—a bathing tank or swimming pool must be provided, in a separate enclosure, where overheated dogs can be given a chance to recuperate.

The dogs now confined in the station have cost their owners more than \$1,000, and I do not consider that these animals are any too well protected from theft, even though the keeper spends most of his time, both night and day, among them. For this reason I would recommend that both the outside as well as the inside of the dog division be strengthened in such a way that entrance from the outside cannot be effected for unlawful purposes.

As stated, the kennels provided for the enforcement of Rule VI are practically full, only two of the smallest ones, those for lap dogs, being vacant. I would therefore recommend that at least six more kennels be built immediately and even this number I do not consider sufficient to accommodate the normal arrival of dogs, even when the regulations become fully known, and its existence is called to the attention of visitors and returning residents bringing dogs with them. Food must be provided and properly prepared, and as the secluded location of the station makes it difficult to get goods or provisions delivered regularly it becomes obvious that the keeper must be provided with means for obtaining the provisions and for pre-

paring them. I have so far provided the keeper with a saddle horse, but he cannot carry three or four quarts of milk and half a dozen loaves of bread, to say nothing of meat, rice and other necessities, on horseback. He must, consequently, be provided with some means of transportation, especially so long as his own living is to be considered, and his absence from the station should be limited to the shortest possible time. Merchants will not deliver regularly small or cheap quantities of provisions at an isolated place like the station, so they have to be fetched. Furthermore, to require a man to live there and to be there night and day—to be responsible for the animals he has charge of—and then, on a salary of \$45 a month, to compel him to provide housekeeping facilities for himself, I fear is asking a little too much. I have kept Mr. Davenport, the keeper, at my house for the past two months, at an expense of at least \$25 per month, but could not afford to continue to do so, besides furnishing him a horse to use in getting to and from the station. Since taking up permanent residence at the station he has slept on a cot in the enclosure among the dogs, the unwarranted publication in the daily papers of quarantined dogs having been seen on Fort street regularly, making him apprehensive of attempts to remove certain animals during his absence. He has, so to speak, been living the life of a dog, with the inevitable result that he has given me notice that he is ready to quit when the next transport for San Francisco arrives. How and where to find a man to take his place I am unable to say and I would therefore earnestly request that a sufficient allotment of funds be granted for the extension and improvement of the kennels and quarters so as to make it possible for a man who is both willing and anxious to do so, to care for and protect the animals of which he has been placed in charge.

(Dr. Norgaard here inserts an itemized statement of what is needed, the total cost being \$1,000.—Ed.)

That awnings or flies over the kennels are necessary will be seen from the fact that the owners of quarantined dogs, in four cases, have provided such protection against the sun as they were able to afford, ranging from the regular army tent fly, costing ten dollars, to an old sheet. A letter from another owner requests that such shelter be provided for his dog, which is detained against his will, and claims as his right under the circumstances that every means to make the animal comfortable during the prolonged confinement be provided. The letter is appended herewith.

A letter from Melbourne states that six trained dogs will arrive here on the next Makura, leaving Sydney May 6. The owner requests permission to land them without quarantine under cover of a certificate of health issued by a sanitary offi-

cial. After consultation with the members of the committee on animal industry, I notified the Honolulu Amusement Company that the dogs would have to go into quarantine upon arrival and suggested that the said company cable the owners to that effect. This they did not consider necessary, stating that the dogs would probably be shipped direct to the coast on the same steamer when it was learned on arrival that they could not perform here.

A deputation of officers from Schofield Barracks called on me last week, requesting that a branch quarantine station for dogs be established at Leilehua and placed in charge of the cavalry veterinarian stationed there. The officers were advised to make a written application to the board, giving their reasons why this should be done.

In concluding this subject I beg to emphasize that I consider the rabies situation as an extremely serious matter, as the introduction of the disease into the Territory would prove nothing short of a calamity, which undoubtedly would result in the sacrifice of a number of human lives. With the nearest Pasteur Institute 4,000 miles away and without means for sending indigent patients there for treatment—it would cost at least \$500 for each person bitten to obtain treatment in either St. Louis or Austin, Texas—it would seem that no step to prevent the entrance of the disease should be neglected or overlooked. And as already stated, the most important means to this end is to gain the confidence and the coöperation of the dog owners by providing safe, sanitary and comfortable quarters for quarantine. In the meantime I would suggest that steps be taken to reduce the principal means of transmitting the disease—the stray and ownerless dog—to the smallest possible minimum. There are hundreds and hundreds of such dogs roaming the streets of Honolulu by day and infesting the alleyways and back yards by night in quest of food, upsetting garbage cans, killing poultry, fighting among themselves and altogether providing one of the worst nuisances with which the city is afflicted, and one which is invariably noticed by the tourist before anything else, and which makes him wonder—if a dog owner—why these stringent quarantine regulations, when no other efforts are being made to protect the inhabitants as well as the decent dogs from the numerous external as well as internal parasitic diseases with which the scavenger dog is affected. A letter from this board to the proper authority under whose jurisdiction the enforcement of the dog license act comes, whether the board of health or the board of supervisors, should be sufficient, under the present circumstances, to cause a speedy reduction in the ranks of these dangerous and often repulsive “friends of man.” A general dog muzzling t, which is always the first step to be taken when rabies

makes its appearance, would be impossible of enforcement here at the present time, and would have to be preceded by wholesale slaughter, before a systematic reduction of the canine inhabitants could be effected. This, however, can be done now, and no dog owner, whether he has neglected to take out a license for his dog or not, need to lose him, as there is still time for advertising and redeeming, which would not be the case if the disease broke out here with the authorities unprepared for handling the large number of dogs which soon would crowd the pounds.

That no funds are available for the enforcement of the dog license act should not be advanced. The dog holds the same position in regard to rabies as the mosquito does to yellow fever, and the extermination, or at least control, of the one is no more important than the other. In either case the stake is a human life.

The enforcement of Rule VI has proved an extremely unpleasant duty and I trust the board can see its way clear to assist this division in making it less onerous by granting the means for the enlargement and improvements enumerated.

Other Business.

For the information of the board I submit herewith the report of the assistant Territorial veterinarian pertaining to the control of bovine tuberculosis, showing that the annual test has practically been finished. The results are highly gratifying, not alone on account of the practical eradication of the disease, but also on account of the effect which the repeated visits to each dairy, accompanied by the county milk inspector, has had in educating the dairy owners up to employing more modern and sanitary methods and utensils in producing clean milk. The recent report of the food commissioner of the board of health on this subject, even though it failed to place the credit where it belonged, is ample proof of the immense progress which the concerted efforts of the various sanitary authorities connected with this problem has had upon the milk supply of Honolulu. That this good work should be extended to the other islands there can be no doubt, and this proposition will be made the subject of a special report to the board in the near future.

Some of the more important correspondence of the division is also submitted for the information of the board.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, April 30, 1912.

Dr. Victor A. Norgaard, Chief, Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu, T. H.

Sir:—I have the honor to submit herewith a report on the work so far accomplished in the eradication of bovine tuberculosis:

During the past month 702 animals were tested with 14 reactions, a percentage of 1.99 per cent. tuberculosis. The districts covered were Aiea, Pearl City, Ewa and Waimano. The tabulated results of the various tests is as follows:

		T.	P.	C.
April 4- 6.	Tom Quinn	5	5	0
" 8-10.	S. Boyama	5	5	0
	Y. Nakamura	5	5	0
	J. Schwank	5	5	0
	F. Johnson	9	8	1
	E. C. Smith.....	9	8	1
	I. Morioko	22	19	3
" 9-11.	R. McKeague	4	4	0
	I. Moniz	2	2	0
	A. Reis	2	2	0
	S. Tado	9	9	0
	K. Shimidsu	2	2	0
	C. E. Eckland	2	2	0
	T. Fugita	2	2	0
	N. Kimoto	2	2	0
	F. De Mello.....	8	7	1
	S. M. McKeever.....	2	2	0
	R. T. McGettigan.....	2	2	0
" 18-20.	H. Focke	8	4	4
" 22-29.	O. R. & L. Co.....	597	593	4
		<hr/> 702	<hr/> 688	<hr/> 14

In the above list the dairy of H. Focke shows the highest percentage, four of the eight animals tested being condemned as tuberculous. That such a condition was found to exist after the number of tests made is due to the fact that the animals condemned on previous tests were allowed to remain in the dairy and spread the infection. At the present time there is in the dairy an animal which has reacted to the test four times, the reaction being in each case typical, still through stubbornness—the owner cannot plead ignorance of the dangers as he has been well informed—and the fact the animal in question was a good milker, she was allowed to remain with the result that on the present test 50% of the cows reacted. Better evidence of the rapid spread of the

disease in a dairy through the presence of one tuberculous animal could not be wanted.

It is hard to understand why, after the large amount of work which has been done and the effort which has been made on the part of the officials of this division to educate the dairymen, giving them the best and latest information on the subject and advising them as to the most economical methods to follow in eradicating the disease, such a condition should exist. In this instance the experience has been a costly one, and one calculated to allay all further opposition to the carrying out of methods of complete eradication of the disease. I am glad to report that instances of this kind are rare and that opposition to the carrying on of the work of the eradication of bovine tuberculosis has died down and in its stead has sprung up a keen desire on the part of dairymen to offer every help possible.

This year's general test of the dairy herds of the island of Oahu is nearing completion and the results are gratifying, indeed. Up to the present time figures show the following:

Total Number Tested.	Total Number Passed.	Total Number Condemned.
4,379	4,586	153

From the above figures it will be seen that the percentage of tuberculous animals up to the present time is 3.22%. There remains in the neighborhood of fifteen hundred animals still to be subjected to the test, but as these are owned by the O. R. & L. Co., and as the percentage of diseased animals among their stock is very low, indeed, being less than 1%, the addition of these to the total number will lower the final percentage of tuberculous animals.

That the campaign against bovine tuberculosis is meeting with success is evidenced by the marked decrease in the percentage of tuberculous animals among the dairy herds of the city and county since the beginning of the work in 1909. This is brought out clearly in the following figures:

	T. Tested.	T. Passed.	T. Cond.	Per- centage.
First Test.....	1,916	1,475	441	23.01%
Second Test	4,152	3,930	222	5.34%
Third Test (uncom- pleted)	4,739	4,586	153	3.22%

In the three years which this work has been going on the percentage has been brought from one quite large, 23.01%, to one quite small, 3.22%, and which may be smaller yet when the test is completed. This is making rapid strides toward the time when bovine tuberculosis among dairy stock on the island of Oahu will be a thing of the past and when this, the third general test, is finished we will have advanced a long way toward the eradication

of this disease in the entire territory. We have taken a step and, although the step is a large one, still we realize that it is but a step and that there remain the other islands to be considered before we can call the Territory of Hawaii rid of this fatal and rapidly spreading disease.

The method of testing, i. e., intra-dermal, which has been in use during the past two years, has proven itself a great success in the handling of the large numbers of stock, some of which are very wild, necessary in making a complete test. Perhaps its greatest advantage lies in the fact that it presents to the dairy owner a marked difference between a reactor and a non-reactor, in other words, between a sick and a well animal, it presents to him a reaction he can see and feel though he may not comprehend and thus in large measure he is satisfied.

This feeling of satisfaction on the part of the owner is of immeasurable value in the prosecution of a campaign of eradication against such a disease as tuberculosis where slaughter of the animal is absolutely necessary if the disease is to be stamped out. Especially is this satisfaction necessary where the work is undertaken among a population of extremely varied nationalities. One may enter into explanation and show temperature charts and try to explain to a Japanese or Portuguese why this animal must be condemned and the one next to it may be passed, although one looks no more sick than the other, but as a rule no impression will have been made and he is very backward about having the animal killed, but if, as is possible, in this test, you can show him a swelling in the sick animal and none in the well one, here is something that, as a rule, will satisfy him. This then is a great advantage which this test possesses and will urge its general adoption in the control of bovine tuberculosis, not to mention its other advantages in the saving of time, labor and expense, and we have proved, to our own satisfaction at least, its equal reliability with the subcutaneous method.

So much for the method and the work accomplished with it. A discussion of its technique and application cannot be entered into here but will be dealt with in a separate report.

A word now as to the general condition of the dairies from a sanitary standpoint. To one who had an opportunity of observing the conditions three years ago, a marked improvement is evident. Under the supervision and instruction of the city and county milk inspector, new barns have been built and cement floors laid; milk rooms are fast becoming the rule instead of the exception, greater care is being exercised in the handling and cleaning of both utensils and animals and the drawing of the milk. Coolers are being installed in many dairies, even in the smaller Japanese dairies, and with a decided beneficial effect on the product. Although there is still room for improvement great advances have been made in the production of milk in a sanitary manner. The constant visits of the milk inspector have, a very

beneficial effect in keeping these improvements in operation allowing of no slackness or discontinuance when once adopted.

The importation of live stock at the port of Honolulu for the past month are as follows:

April 4, Tenyo Maru, 2 cts. Japanese games; April 5, S 19 cts. poultry; April 9, Lurline, 28 mules, A. & B., 5 h A. & B., 9 cts. poultry; April 16, Wilhelmina, 5 dogs, 2 cats, rats, 2 cts. pigeons, 9 cts. poultry; April 20, Mexican, 2 h Q. M. Dept.; April 24, Honolulan, 43 mules, 1 stallion, Schu 11hogs, H. J. Brown; 5 cts. poultry; April 24, Zealandia, 2 April 26, Sierra, 23 cts. poultry; April 29, Shinyo Maru, Japanese games.

Respectfully submitted,

LEONARD N. CASE,
Asst. Territorial Veterinarian

DAIRY CATTLE INSPECTION, 1909-1912.

	T.	P.
1. Wm. Gomes	10	9
2. J. H. Cummings	5	5
3. D. P. R. Isenberg	337	312
4. Marshall & Azevedo	28	26
5. P. M. Pond	37	36
6. M. Gomes	28	28
7. H. B. Brown	13	13
8. S. J. Grace	5	5
9. Capt. Hartman	3	3
10. J. E. Faria	20	20
11. R. Compos	12	12
12. Frank Gouveira	24	24
13. J. Quintal	2	2
14. J. M. Whitney	10	9
15. T. F. Farm	45	42
16. Omai Tatsuichi	10	10
17. F. C. Krauss	1	1
18. K. Inouye	8	8
19. W. P. Alexander	5	5
20. I. Nagaki	15	15
21. J. H. Cummings	4	4
22. Mrs. C. M. White	10	9
23. Frank Medeiros	12	12
24. P. Miyakawa	13	13
25. J. Allencastro	7	7
26. K. Yamashita	7	6
27. S. Hiarata	14	14
28. C. K. Quinn	6	6
29. Chas. Frazer	1	1
30. College of Hawaii	15	15
31. H. E. Cooper	15	15
32. Frank Andrade	81	80
33. Kawaiahao Seminary	15	15
34. Mrs. Mary Quintal	8	8
35. S. Tsumoto	9	9
36. M. Kawamura	6	6

	T.	P.	C.
37. Mrs. W. W. Hall.....	1	1	0
38. G. P. L. Robinson.....	5	5	0
39. Frank Valph	6	6	0
40. Chas. Bellina	138	112	26
41. S. de Nobriga	13	13	0
42. Oahu College	12	12	0
43. Manuel Abreau	3	3	0
44. John Rezants	13	13	0
45. C. J. Day.....	5	5	0
46. Geo. Wond	18	18	0
47. Antone Pires	8	8	0
48. Geo. Holt	37	35	2
49. Kamehameha Schools	44	42	2
50. W. E. Miles	17	16	1
51. Frank Correa	13	12	1
52. Mrs. Mary Riedell.....	10	9	1
53. Victornia Souza	35	33	2
54. Alexander Young Dairy.....	46	46	0
55. Desidero Tello	2	2	0
56. John P. Mendonea.....	10	10	0
57. L. C. Fernandez.....	8	8	0
58. J. G. Silva.....	4	4	0
59. A. Wilder	2	1	1
60. Richard Kapena	2	1	1
61. A. Tavash	3	3	0
62. Mrs. E. Johnson.....	2	2	0
63. S. M. Damon.....	148	143	5
64. Galt & Carter.....	13	13	0
65. M. Ota	1	1	0
66. Chas. Bellina	28	28	0
67. Chas. Lucas	90	80	10
68. S. M. Damon.....	182	178	4
69. P. M. Pond.....	327	317	10
70. O. R. & L. Co.....	1403	1390	13
71. Y. Ogawa	4	4	0
72. J. A. Templeton.....	37	35	2
73. Laie Plantation	16	15	1
74. Industrial School	48	48	0
75. F. S. Lyman.....	17	17	0
76. E. K. Elsworth	1	1	0
77. J. Coonradt	3	3	0
78. Waianae Ranch	292	186	6
79. P. Isenberg	129	116	13
80. Tom Quinn	5	5	0
81. S. Boyama	5	5	0
82. Y. Makamura	5	5	0
83. J. Schwank	5	5	0
84. F. Johnson	9	8	1
85. E. C. Smith.....	9	8	1
86. I. Morioko	22	19	1
87. R. McKeague	4	4	0
88. I. Moniz	2	2	0
89. A. Reis	2	2	0
90. S. Tado	9	9	0
91. K. Shimidsu	2	2	0
92. C. E. Eckland	2	2	0
93. T. Fugita	2	2	0
94. N. Kimoto	2	2	0
95. F. De Mello	8	7	1

	T.	P.	C.
96. S. M. McKeever.....	2	2	0
97. R. T. McGettigan.....	2	2	0
98. F. Focke	8	4	4
99. O. R. & L. Co.....	597	593	4
	<hr/> 4739	<hr/> 4586	<hr/> 153

DIVISION OF ENTOMOLOGY.

Honolulu, March 31, 1912.

Hon. Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen: I respectfully submit my report of the work of the division of entomology for the month of March as follows:

During this month we boarded 35 vessels and found vegetable matter on 20 of them. Careful inspection of all shipments gave the following results:

Disposal With Principal Causes.

	Lots.	Parcels.
Passed as free from pests.....	512	14,435
Fumigated	33	459
Burned	30	57
Total inspected	<hr/> 575	<hr/> 14,951

Rice Shipments.

Thirty thousand four hundred and thirty-three bags of rice arrived during the month of March and being found free from pests were permitted to enter the Territory.

Pests Intercepted.

In a shipment of plants from Japan we found a colony of ants (*Formosa species*) and some pupas of a tipulid in the soil and a lepidopterous larva on the plants. All soil was washed off the plants after these had been fumigated in the usual manner. A passenger brought a bundle of large double flowering cherry trees. We found them badly infested with two scale insects (*Diaspis pentagona* and *Pseudaonidia duplex*), also some brown velvet lichen. The trees were refused entry and have been destroyed.

One lot of orchids arrived from Java in a very dry state, apparently dead, but we found a very lively colony of ants (*Prenolepis species*) in the package and fumigated the shipment.

A small package of mangoes in the possession of a passenger on the transport Logan from Manila was confiscated and destroyed.

Forty-eight packages of fruit and vegetables were taken away from immigrants at the United States immigrant station, which came from China and Japan.

Hilo Inspection.

Brother M. Newell reports the arrival of seven vessels at the port of Hilo, finding two vessels carrying vegetable matter consisting of 45 lots and 784 parcels, all being passed as free from pests.

Inter-Island Inspection.

During the month of March, 59 steamers were attended to and the following shipments were passed on: 148 bags taro, 54 cases plants, 20 bags taro tops; total 222; 1 package seed potatoes, 1 package hop roots, 1 package lily root, 1 package waterchestnut; total, 4; grand total, 226 packages.

The following packages were refused shipment: 30 packages fruit, 16 packages vegetables, 5 lots plants, 1 lot sugar cane, 1 lot lily roots and soil, 3 cocoanuts; total, 56 packages.

One case of tomatoes was found infested with maggots, probably those of the melon fly.

Respectfully submitted,

E. M. EHRHORN,
Supt. of Entomology.

REPORT FOR APRIL.

Honolulu, April 30, 1912.

Hon. Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen: I respectfully submit my report of the work of the division of entomology for the month of April as follows:

During this month there arrived 36 vessels, of which 24 carried vegetable matter. The usual careful inspection made, resulted as follows:

Disposal With Principal Causes.

	Lots.	Parcels.
Passed as free of pests.....	627	14,230
Fumigated	16	169
Burned	23	122
Soil removed	2	8
Total inspected	668	14,529

Rice Shipments.

Twenty seven thousand four hundred and forty bags of rice arrived from Japan during the month of April and being found free from pests were permitted to enter the Territory.

Pests Intercepted.

Twenty-seven packages of vegetables and 52 packages of fruit were confiscated from passengers and immigrants during the month and destroyed by burning. Examination showed much of these to be badly infested with scale insects and other pests, emphasizing that the prohibition of such materials into the Territory is a very good regulation. A passenger brought a box of plants, mostly roses, from Japan, and we found a *Lepidopterous* miner in many of the stems; the whole lot was destroyed by burning. Three boxes of sandpears from Japan arrived by parcels post for a Japanese at Papaikou, Hawaii. After passing the custom house examination, we confiscated the packages at the postoffice, giving the postmaster our receipt for the same. As fast as individuals of the large number of immigrants from the steamer Harpalion are released, we go through their belongings and we have found quantities of seeds which we subject to a strong fumigation as a precaution against hiding pests.

Hilo Inspection.

Brother M. Newell reports the arrival of 11 vessels at Hilo, 4 of which carried vegetable matter and 1 vessel ballast. There were all told 115 lots, consisting of 1827 packages of fruit and vegetables, and from this amount 5 packages of vegetables were destroyed, being in bad condition.

Inter-Island Inspection.

During the month of April 70 steamers were attended to and the following shipments were passed on: 400 bags of taro, 86 crates of plants, 2 lots of cutflowers, 1 bag of cabbage, 1 bag of cocoanuts; total, 490 packages inspected and passed.

The following packages were refused shipment: 93 packages fruit, 1 package plants, 31 packages vegetables; total, 125 packages inspected and refused shipment.

Beneficial Insects.

Four boxes of predaceous beetles (*Calosoma lugubre*) were received from Dr. W. D. Hunter, bureau of entomology, Victoria, Texas. About two years ago this matter was taken up by me and the promise then made. At the request of the president, I delivered the beetles to Mr. T. D. Fullaway of the United States experiment station; he and I carefully examined the boxes together. Out of 102 beetles, 59 arrived alive, four just showing life, and the rest died.

Miss Louise Gulick, who has acted as laboratory assistant, resigned on April 15, and Miss Maud Dawson, a teacher at the Normal school, is giving us two hours daily of her time assisting us in our laboratory work.

Owing to the change of schedule of the T. K. K. and Pacific Mail steamship lines, we have found it rather difficult to handle these vessels promptly, as on some days we have had as high as four steamers arriving at this port.

Respectfully submitted,

E. M. EHRHORN,
Supt. of Entomology.

*BOARD OF COMMISSIONERS OF AGRICULTURE AND
FORESTRY.*

FRUITFLY CONTROL.

Honolulu, April 4, 1912.

FIFTH MONTHLY REPORT.

To the Commissioners, Board of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I submit you a report of the work of this department for the month ending March 31, 1912, viz.:

INSPECTION.

During the past month the work of inspection and destruction of infested fruits has continued on the lines previously explained. The mango season is now fairly advanced and the inspection and gathering of fallen fruits are giving both householders and inspectors much work. This also applies to kamani and other large trees bearing fleshy seeds, which are badly attacked by the fruitfly.

GENERAL CONDITIONS.

Excepting in areas devoted to vegetable gardens, general conditions, as a whole, are more satisfactory than might have been expected at this season of the year. At the beginning of the campaign inspection work included the areas in vegetables, which were generally attacked by melon fly and as a result many of the Orientals were prevailed upon to gather and destroy their infested vegetables. Since the mango season has come in, however, the inspectors are obliged to devote all of their time to Mediterranean fruitfly work and the vegetable gardens are again in bad shape in so far as melon fly is concerned. It is a difficult

matter to make the Asiatic understand why he should not "plough in" his infested vegetables instead of burning them thoroughly.

I am pleased to report that so far the mango has not shown as bad infestation of the Mediterranean fruitfly as it did last season. Many of the fruits are damaged by fungus and as a result of fermentation are attacked by species of small vinegar flies. These latter only attack fruit in a rotting or fermenting condition.

Whilst the majority of householders show a marked willingness to coöperate in the work of "clean culture," there are very many who appear irritated at the continual calls of inspectors. These latter householders apparently do not appreciate the fact that if they kept their premises free of ripe or infested fruits, there would be little occasion for continued inspection. As a whole, however, most of the residents are pleased to have their attention called to any insanitary horticultural conditions on their premises.

INSULAR CONDITIONS.

The organization of special committees to superintend the campaign in the districts of Hawaii and Maui is now complete. Commissions have been issued to the members of committees as special agents of the Board, whilst the inspectors named by the committees have received their official appointments.

The allotment by the "conservation fund committee" of \$3500 to Hawaii and \$1000 to Maui to assist in their campaign to either control or prevent the introduction of the Mediterranean fruitfly in their several districts, has been pro-rated in a manner apparently satisfactory to all concerned. Letters of appreciation for the financial assistance granted have been received from a number of the committees. The cost of inspection, over and above the amount allotted, will be paid out of funds locally contributed in each district.

I am sorry to say that the fruit material received from Kona, about which I previously reported, has bred out the Mediterranean fruitfly. That district and Kohala are the only two on Hawaii where, so far as is at present known, infestation exists. It is to be hoped that the system of inspection at points on the belt roads leading out of Kohala and Kona will be efficient and thereby perhaps postpone for an indefinite period the introduction of the fly into the other districts. As the Inter-Island Steam Navigation Co. has given instructions to the officers on all its steamers not to carry Hawaiian fruits from infested districts, it is hoped that this coöperation, together with the vigilance of the inspectors at way ports, will greatly assist in keeping the pest away from districts so far not known to be infested.

PARASITIC WORK.

I am pleased to report that Prof. Silvestri, the expert at present employed by the Italian government and other entomological work in South

an expert
economic
at

last obtained leave of absence from his principals and will at an early date start upon the expedition to tropical West Africa in search of a parasite for the Mediterranean fruitfly and cotton bollworm. Prof. Silvestri's services have been engaged for a period of twelve months.

GENERAL REMARKS.

Since my last report, the following have to be added to the long list of fruits or seeds infected with Mediterranean fruitfly. These, as well as others previously named, have been bred out in the Board laboratories:

Chrysophyllum oliviforme (called Damson Plum in Jamaica);
Thevetia nerifolia (locally called "Yellow Oleanda").

Respectfully submitted,

W. M. GIFFARD,
Director, Fruitfly Control, T. H.

Honolulu, May 1, 1912.

SIXTH MONTHLY REPORT.

To the Commissioners, Board of Agriculture and Forestry, T. H.,
Honolulu, T. H.

Gentlemen:—I beg to submit the report of this department for the month ending April 30, 1912, viz.:

INSPECTION.

Inspection throughout the quarantined districts in Honolulu has continued on the same lines as previously reported, the work in general including the gathering and destroying of infested fruits having been done in as thorough a manner as local conditions would admit. The mango season is almost at its height and much of the attention of inspectors has, of course, had to be given to the daily sweeping up and disposal of the fallen fruit. The percentage of mangoes found infested with the Mediterranean fruitfly is small as compared with last year. This is altogether satisfactory in view of the fact that the crop this year is unusually large.

The department has had additional work thrust on it because of the unfortunate shortage of teams and men in the county garbage system. There have been numerous complaints from householders, who do not subscribe to the garbage department, that their fruit is not carted away regularly but left to decay in containers on the sidewalks. The garbage department had promised to cooperate with the board to the extent that all fruit, if placed on the sidewalk in containers within the garbage limits, would be promptly cared for even though the householder was not a subscriber to its system. It is very unfortunate that the campaign cannot be assisted by the garbage department to the extent expected of it, and in view of existing conditions it is quite

apparent that no systematic work as to efficient disposal of fruit can be expected from the county until it adopts a free garbage system and increases its equipment. In the meantime we are ourselves hauling to the incinerator as much infested fruit as our limited means will allow. A number of householders, within the garbage limits, having sufficient trash on their premises to burn their fallen fruit, prefer that method to taking chances on a weekly or bi-weekly system of collecting as at present prevails. Furthermore, householders complain that when the fruit is not promptly carted away from the sidewalk by the garbage department, certain classes of school children rummage the containers and distribute a part of the contents on the sidewalk, where it is left to rot unless the householder troubles himself to sweep it up. The complaints referred to are not particularly against the officials of the garbage department, as these have from the beginning of the campaign shown a desire to coöperate to the best of their ability. The trouble evidently lies in the fact that there is no free garbage system and because of a shortage of teams to collect daily and bi-weekly on all thoroughfares throughout the garbage limits.

INSULAR CONDITIONS.

A sample of fruit infested with the larvae of a species of fly has been sent this department from the Waikapu district on the Island of Maui. Others gathered in Kula and Ulupalakua, Maui, by Mr. G. P. Wilder, were also turned over to us for examination. All these samples are exceedingly suspicious and it is quite probable that the Mediterranean fruitfly will be bred from at least one, if not all, of them. Should such be the case and owing to the wide range of distribution, it would go far to show that, in all probability, the fly has been on Maui for some months, but for some reason or another has not been discovered by either the local authorities or residents. The same conditions may also prevail in districts on Hawaii, where, up to the present, the pest has not been discovered. It is quite unfortunate that the lack of funds prevented Hawaii and Maui from organizing and excluding Hawaiian grown fruits from their local ports at an earlier period than they did. This they and all the other islands should have done as soon as it was reported that the fruitfly existed on Oahu.

GENERAL REMARKS.

As intimated in my last report the services of Dr. F. Silvestri have been secured for a twelve months' period to search for specific parasites on the Mediterranean fruitfly and cotton boll-worm. Final instructions were sent to Dr. Silvestri about three weeks ago and he is probably on his way to tropical West Africa by this time. Two or three months ago I communicated with the minister of agriculture for West Australia in connection with

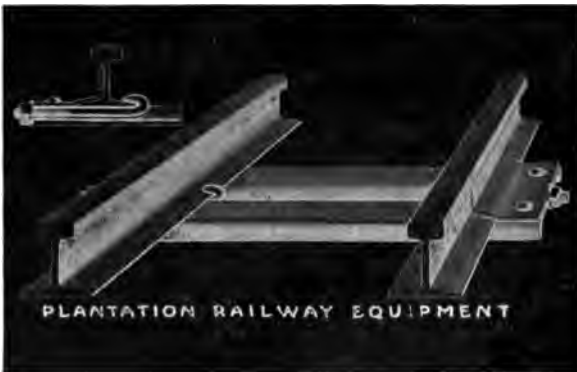
a parasite which has been introduced there some years ago, but which, so far as is known, has not become established. This particular parasite was supposed to attach itself to a species closely allied to our local melon fly (*Dacus cucurbitae*) and it has been said that it would incidentally attack the Mediterranean fruitfly (*Ceratatis capitata*). Efforts are being made by this department to secure a colony of this particular parasite for experimental purposes, but it is doubtful whether it can be obtained from Australia for the reason above stated, viz., that, so far as is at present known, it never established itself under natural conditions. On this point I expect to hear definitely in a month or more.

This department continues to receive the coöperation of the U. S. Experiment Station and has concluded arrangements with Dr. E. V. Wilcox, its director, that all parasitic material received from the fruitfly and cotton bollworm campaign shall be solely handled by his entomologist.

Mr. Weinland, the agent of the California State horticultural commission, continues to coöperate with this department in its present campaign. Besides assisting in the inspection of fruits intended for export, he is devoting much time to "trapping" and poisoned spray experiments. Mr. Weinland also keeps himself informed as to fruitfly conditions in general on Oahu.

Respectfully submitted,

W. M. GIFFARD,
Director, Fruitfly Control, T. H.



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JUNE, 1912

No. 6

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection and growing.

The list includes both forest and ornamental trees, such as Silt On Koa, various species of Eucalyptus, Golden and Pink Showers, Pride India, Palacians, Albizia, etc. The price of the seed varies from 25 cents per ounce. The seedlings may be had for 2½ cents each except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed David Haugh, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 26 HONOLULU, HAWAII.**

EDW. M. EHRLHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

JUNE, 1912.

No. 6.

The Forester acknowledges the receipt of a small library in one package, of Proceedings of the California Academy of Sciences, fourth series. There are four treatises bearing on the expedition of the Academy to the Galapagos Islands, 1905-1906, in which, respectively, Francis X. Williams deals with the butterflies and hawk-moths, John Van Denburgh with the snakes, Alban Stewart with the botany, and Mr. Van Denburgh, again, with the geckos of the islands. Mr. Van Denburgh is also the author of "Notes of a Collection of Reptiles from Southern California and Arizona;" James Perrin Smith, of a pamphlet on the "Geologic Range of Miocene Invertebrate Fossils of California," and Frank M. Anderson, of one containing 146 pages besides many interleaved illustrations on "The Neocene Deposits of Kern River, California, and the Temblor Basin." These documents will be a valuable addition to the scientific works in the library of the Territorial Bureau of Agriculture and Forestry.

Work conducted at the Pasteur Institute at Nha-Wang, Cochinchina, has shown that the employment of a special virus for producing epidemics among rats is not to be considered as a serious method of reducing the numbers of these rodents. The disease produced by the virus shows at first a great activity, but the ultimate effect is to produce a race of rats that are immune to it.

Somewhat peculiar results have followed the rubber boom in Singapore. More and more land has been planted in Para rubber, until at the end of last year the area under cultivation was about 14,000 acres. The planting of this tree in every corner, even in quite unsuitable localities and in small patches, caused a remarkable diminution in the supply of vegetables, fruit, poultry, and even pigs, many Chinese abandoning other occupations to plant rubber.

Natal has experienced the advent of the San Jose scale, but the agricultural authorities hope to keep it in subjection through the methods of control which severe experience has brought to a high standard in the United States, and of which other countries that may be visited by the pest can now have the benefit.

The exports of cacao from Trinidad continue to increase in quantity, 57, 858,640 pounds, of the value of \$6,150,485, having been exported in the year 1910. Rubber is receiving much attention in that island. There has been a considerable importation of thoroughbred livestock the past year.

Experiments made in cotton growing at the agricultural station, Tamale, on the Gold Coast, Africa, have given most unsatisfactory results. An official report says that unless better returns can be shown in the future it would appear that cotton cannot be successfully grown for export.

Mr. D. P. R. Isenberg has tendered his resignation as a member of the board of agriculture and forestry, on account of intended absence from the Territory for some time. It will not be easy to find one to take his place, with the practical knowledge and business sagacity he has brought to the board.

Attempts made the past two or three years to introduce the Lima bean into Manchuria have been abandoned, on account of the expense incurred in protecting the seedlings from high winds.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

FRUIT FLY CONTROL.

Seventh Monthly Report.

Honolulu, Hawaii, June 1, 1912.

To the Commissioners, Board of Agriculture and Forestry,
Territory of Hawaii, Honolulu.

Gentlemen:—I beg to submit the following report for the month ending May 31, 1912, viz.:—

It is quite fortunate that the quarantined area in Honolulu and suburbs has been kept fairly clear of all ripe and overripe fruit other than the mango, of which latter there is an unprecedented crop. Our small staff of inspectors has been kept busy in an almost futile endeavor to keep all grounds clear of

this fruit, the tree of which is now in full bearing. It takes but a glance at the number and fruiting conditions of these scattered trees to realize the stupendous work of efficiently gathering and destroying a fruit which during the season is continuously falling from all these large trees day and night. It is almost unnecessary to say that with such immense crops of mangoes extending over a period of three months or more perfect work in gathering and destroying these cannot be expected, more particularly under the peculiar local conditions which exist in the area of approximately 50,000 acres under quarantine between Kaimuki and Moanalua. To properly cope with such conditions, it would take a force ten times as large, and even then the work would be partially ineffective unless a very much larger proportion of householders co-operated. Of course, there are many who keep their grounds fairly free of fallen mangoes, but the large majority of residents, and particularly those who can ill afford to employ a yardboy, leave the gathering of this fruit to our inspectors and such laborers as we are now forced to employ at odd times to help out the situation. Even where mangoes are not used by householders, there are but few, including the wealthier class, who voluntarily strip the trees or care to have this done for them. Again, there are a large number of vacant lots containing mango trees, the owners or controllers of which it is difficult to locate. In the majority of such instances as these we will be obliged to strip and gather the fruit ourselves, as well as cart the same to the incinerator, if there is not sufficient brush to burn same on the premises. During the month we have had a wagon busy hauling several loads of such fruit every day, and during June, if the payroll will stand it, several more carts and day laborers will have to be employed. It is surprising what immense quantities of this fruit have been burned on the ground or else carted away to the incinerator since the season opened, all of which would have been left as formerly, to ferment and rot on premises, causing not only a very insanitary condition in localities, but also would have been the means of an altogether unnecessary reproduction of fruit flies in countless numbers. Unfortunately there is a very bad fungus condition existing in much of the mango fruit which is causing it to rot and ferment before falling. This fermentation attracts numerous species of vinegar flies, the small maggots of which give the impression that the fruit is all infected with the Mediterranean fruit fly. Such is not the case, but nevertheless many of the fruits are really attacked by the latter pest and it is impossible to discriminate amongst such large quantities as daily fall to the ground. Whilst there is much good fruit on many of the trees and on the ground it is best to be on the safe side and sweep up and destroy every one that has fallen. I am dwelling at some length on these pecu-

liar conditions, as they are liable to happen to a more or less extent every summer during the mango season, and they go far to prove what I have tried to impress upon the authorities and others from the start, that it is useless to expect either a perfect control of the Mediterranean fruit fly in Honolulu and suburbs with a comparatively small appropriation and without that unity and coöperation of all residents which is so necessary in all artificial methods of control when these are performed in non-commercial areas. Without such unity and without such coöperation, even an appropriation of many more thousands of dollars will not be as effective as it should be. With conscientious and efficient work, however, clean culture and allied artificial methods, together with the proper coöperation of householders, will produce results in proportion to the amount expended. To a great extent this has already been manifest to proficient and unprejudiced investigators. Such mechanical work when performed by all in a proper spirit of coöperation can do no more than partially control this pest. In a tropical country like ours the so-called eradication or extermination of such a pest as Mediterranean fruit fly by mortal man is not possible. That it has been in a measure controlled or lessened in numbers by climatic conditions and artificial methods in other parts of the world is fairly well accepted, but such countries as have recorded these facts practically all have their fruits growing in orchards on a commercial scale, and again some of them have a mild winter frost which occasionally checks the pest. Few places have a similar environment and tropical jungle of fruits all the year round as we have at our back doors. To a more or less extent very good results should obtain here, provided the same unity and coöperation existed amongst all our residents as occurs in other places where large commercial interests are at stake. The point was raised by me early in the campaign as to the desirability of expending such a comparatively small appropriation as that which we are working with and then expecting great results in view of local economic conditions, not only on this island, but also on others of the group. We have few fruits of commercial importance other than the banana and pine, and these latter, under natural conditions, are so far not attacked by the fruit fly. When it is considered that artificial methods of control, such as clean culture, spraying, etc., etc., means a continuity of immense appropriations, are not some people expecting too great results all at once from a comparatively small fund? Even the \$35,000 which it appears Congress will eventually appropriate to assist in this campaign will be but a drop in the bucket considering the scattered jungles of fruit trees in Honolulu and vicinity and the wild and mountainous expanses of territory here and on all the islands. These large areas not only have the guava and

mountain apple on the slopes and in the valleys, but also fleshy seeds of indigenous trees, most of which latter are just as susceptible or adaptable to the pest as is the kamani and coffee berry of the lower lands, two of the most infected fruits growing in the Territory. However, as before stated, results as to artificial methods of control in any one region will be in proportion to the amount continuously appropriated for the work, provided that the latter is conducted under the well accepted methods of other countries and that unity and coöperation is at all possible.

The only hope I have, as has been repeatedly stated in previous reports, is in the discovery of a specific parasite. To find, introduce and successfully establish such a parasite would be worth the best part of any one large appropriation which either this Territory or Congress would set aside for clean culture methods. With the successful establishment of such a beneficial insect, nature's methods would accomplish much more in a general way of perfect control than we can ever expect by the usual artificial methods, more particularly if both of these were combined in a systematic and scientific manner. To this end every effort should be made to push the entomological research work in suitable tropical countries where this particular species of fruit fly is known to have its habitat in exceedingly small numbers. Such work, to be successful from a scientific and economic standpoint, should only be undertaken by entomologists of the highest order and who have had previous experience in successful work of a similar nature. In Dr. Silvestri, who is already preparing for the field, we have one of these men, and the very best authorities indicate tropical West Africa (where he is going) as the most suitable place to explore for a parasite of the Mediterranean fruit fly. If later on funds are available, I believe it would be money well spent to assist this research work by the addition of another equally good economic entomologist and have him sent to another section of Africa where the fruit fly is not known to be a pest but exists only in small numbers. It is quite possible that in such a locality the fly is being controlled by either a parasite or predaceous enemy, either of which might be found to some extent suitable to our requirements. Of course, such parasitic research work (particularly that of the Mediterranean fruit fly) is altogether problematical as to results, but the Territory has already succeeded on similar lines under private organization, and there is no reason why, under government auspices and with sufficient funds, a proportionate amount of success should not be obtained. In any case it would be settled once and for all whether future search for such a parasite was to be negative in results. The success of such work to a very great extent depends on the selection of the entomologist, not only for the field work, but also as to those who handle the material after it arrives safely at its destination. For obvious

reasons only the most experienced of men in this class of work should be allowed to handle such material.

Since my last report I have received a communication from the Chief of the Bureau of Entomology at Washington, D. C., in which he informs me that the congressional appropriation to assist the Territory in the fruit fly campaign has passed both houses and would eventually find its way to the President for signature. If signed, the appropriation will become available on July 1, and will, of course, be expended under the direction of the federal bureau. The Chief Entomologist, Dr. L. O. Howard, in asking for coöperation and advice, states that he has engaged a Dr. Back to direct the expenditure, and that the gentleman would in all probability be in Honolulu early in July. After the arrival of Dr. Back, the board will coöperate with the federal department in extending the work which will no doubt be possible with the larger sum available. It goes without saying that Dr. Back will also have to undertake work of control on the other islands, which our small local appropriation has not made possible. As you already know, the insular inspection and control has been in the hands of district committees appointed by the island commercial organizations. The board, however, has kept in communication with the chairmen of these committees, has issued commissions to such inspectors as the latter have appointed, and it has furthermore arranged with the Territorial administration to apportion the two larger islands a small sum to assist the various districts in the exclusion of the pest. Unfortunately, the fruit fly has since been discovered in almost every district on both islands, and it will not be long before the infestation will be general owing to the uninterrupted large areas of guava and wild fruits which prevail along the upper slopes.

In view of changed conditions as to prevalence of fruit fly on the other islands, there may perhaps be necessity for a slight modification in the Territorial regulations as now in force. I do not think, however, that any change should be made until we have received an expression of opinion from the district and commercial organizations on each island.

The alleged complaints because of a failure to export fruits and vegetables from any of the other islands to Oahu were based on a wrong interpretation of existing regulations by officials over whom this board had no control. There have never been any legal restrictions as to the importation of such supplies on Oahu since the fruit fly was first discovered here. The misunderstanding was easily and satisfactorily settled as soon as investigated.

In addition to the usual inspection, gathering and destruction of fruit, which has been maintained during the month, there has also been considerable spraying of large sections of fruit gardens in and about Honolulu. Experimental trapping of adult fruit flies under the Australian method (kerosene

and other solutions) has also continued. Much more of this latter work, as well as spraying, will no doubt be possible as soon as the congressional appropriation is available after Dr. Back's arrival. The spraying solution used is the well-known Cape Colony (Mally) formula, viz., proportions of arsenate of lead, molasses and water. Our small appropriation, which had to last for over a year, or until the next legislature convened, has not made it possible to spray beyond the experimental stage, although during May much has been done by a special gang on these lines. I have refrained from this method in the large colonies of honey bees, as it is quite possible that the solution may poison the workers in more or less numbers. As the honey business in the Territory has increased to large proportions of late years and is in fact equal, if not greater, than any commercial interests in fruits other than pines, I am inclined to disfavor spraying with poisoned solutions in sections where hives are kept on a commercial scale. When Dr. Back arrives I shall present this feature to him most forcibly and, if possible, prevail upon him to restrict spraying, as I am doing now, to such areas as are not frequented by large numbers of bees seeking food.

I have also to report that as a result of laboratory work the fruit fly has been bred naturally out of fleshy seeds of the sugar palm (*Arenga saccharifera*) and the fruits of the elengi tree (*Mimusops elengi*). The foregoing list may be added to the already extensive breeding results from our laboratory.

As there is a possibility that the labor gangs of the Sanitary "Clean-Up Day" Committee may mix quantities of fruit with other garbage on June 20 (Clean-Up Day), I shall communicate with the above organization and request its coöperation in order that the fruit gathered may be sent immediately to the incinerator and not left indefinitely on sidewalks or dumps. I intend further to show that the board has a desire to coöperate in the general clean-up of the day by loaning them our full staff of inspectors.

Mr. Weinland, the representative of the California Horticultural Commission, has during May increased his staff of inspectors of fruits, etc., intended for shipment to the coast. This has proportionately reduced our own gang for the time being. I shall immediately bring up our own staff to such proportions as the monthly apportionment of both the California and Territorial appropriations will permit.

During May I made a short visit of inspection at Hilo, Kau and Kona. In the latter district I stayed the best part of a week investigating fruit fly conditions in coffee. As the pest distributed itself throughout the district in a very short time after its first discovery, the planters were somewhat alarmed as to what might be the result to their coffee and other crops. I found the district well organized as to a "Control Committee" and the members of

the district club appeared alive to the fact that they would have to take preventive means to stop an overproduction of the fly. Owing to the nature of the ground, which is mostly disintegrated "aa," it is hardly possible to do any systematic clean culture work, but there is no reason why the spraying and trapping method should not be carried out with some success, if properly attended to. Kona's coffee is grown in fairly large and uninterrupted areas, and therefore the spraying could be done by each small planter and by others interested on a commercial scale and with less difficulty than in other sections on the islands.

Futhermore, the berries are in most instances pulped at central mills and the pulp pile can be treated with lime or acid and an enormous percentage of maggots destroyed. It has not been demonstrated to what extent the coffee berry or the bean is damaged by the maggot. Apparently it does no particular harm, but it would be rash to finally conclude that such is the case. The question involves a series of experiments by both chemist and plant pathologist. During this visit I was accompanied by Mr. D. Fullaway of the U. S. Experiment Station, and both of us had several conferences with the Kona Control Committee, looking to the further organization of artificial methods of control to suit conditions in that district.

I am indebted to Dr. Wilcox and Mr. Fullaway, both of the U. S. Experiment Station, for official courtesies and cöoperation rendered in the control work during the past month. The office also extends its thanks to Mr. G. Wilder for samples of infested fruits used for laboratory purposes.

Respectfully submitted,

W. M. GIFFARD,
Director, Fruit Fly Control, T. H.

DIVISION OF FORESTRY.

Honolulu, Hawaii, June 8, 1912.

Board of Commissioners of Agriculture and Forestry, Honolulu,
Territory of Hawaii.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for the month of May, 1912:

During the first half of May, I was in Honolulu engaged in part in the preparation of reports and statements desired by the board, including an estimate of expense for the fiscal year July 1, 1912-June 30, 1913.

On May 9, at the request of the trustees of the Bishop Estate, I visited lands belonging to them at Kaneohe, Oahu, subsequently submitting a brief report recommending a forest boundary and outlining a program of tree planting for a portion of the tract.

Trip to Hawaii.

From May 17 to 31, I was on the Island of Hawaii, engaged on a general inspection trip that included an examination of the condition of the forest in the Kau Forest Reserve, a visit to the Hilo Nursery in charge of Bro. Matthias Newell, where about 10,000 seedling trees of various kinds were seen, awaiting distribution, an inspection of the tree planting now in progress on waste lands of the Hawaiian Agricultural Company's sugar plantation at Pahala, and a careful checking up and inspection of the forest planting that has been going on, under contract, on the government reserve of Puukapu, above Waimea village. Incidentally, I saw a good many people along the way who had interests in one and another forest matters.

The tree planting at Pahala is especially to be commended as being just the sort of work which this division has been persistently advocating for a number of years—the utilization of gulch sides and other waste areas not adapted for sugar cane, by the planting of trees useful for fuel or wood. *Eucalyptus robusta* and *E. Globulus* are the trees that have mostly been planted. Along some of the roads and about the newer laborers' camps lines or shelter belts of these and other trees have been set out. The work is receiving not a little of the personal attention of Mr. W. G. Ogg, manager of the Pahala Plantation, who has become an enthusiastic tree planter.

The tree planting at Waimea is being done under a contract entered into last year between this department and Mr. A. W. Carter. Some forty odd acres of *Eucalyptus robusta* have been set out. The trees are spaced six feet apart, 1210 to the acre. The stand is in excellent condition, only a very small percentage of the seedlings set out having died. Under the contract, Mr. Carter furnished the seedlings from the Parker Ranch Nursery at Waimea. This forest plantation is now being extended by him on the fee simple land of Waikoloa, owned by the ranch. In all there will be planted a considerable block of forest.

Work at the Government Nursery.

The routine report of the Forest Nurseryman, transmitted herewith, gives the details of the work carried on at the Government Nursery and the Makiki Station during the month.

New Circular.

During the month a new circular of the Division of Forestry has been issued, No. 2, entitled "Instructions for Propagating Forest, Shade and Ornamental Trees," by David Haughis, Forest Nurseryman. This circular is a revision and enlargement of an earlier press-bulletin. It contains practical directions about va-

rious sorts of tree planting. Copies may be had free upon request.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

R. S. Hosmer, Esq., Superintendent of Forestry, Honolulu, T. H.

Dear Sir:—The following report gives the principal work done during the month of May:

NURSERY.

Distribution of Plants.

	In seed boxes.	In boxes transplanted.	Pot-grown.	Total.
	1000	3110	3071	7181
Sold	700	250	854	1804
Gratis	<hr/> 1700	<hr/> 3360	<hr/> 3925	<hr/> 8985

Included in the gratis number is 1000 transplants of *Casuarina quadrivalvis* sent to Pupukea Water Reserve; 1000 assorted transplants, and 1625 pot-grown trees to Mr. Owen in payment of part of planting contract; 800 transplants and 687 pot-grown *Cryptomeria japonica* were sent to South Kona Ranch Co.

Collections.

Collection on account of plants sold amounted to.....	\$10.20
From Division of Animal Industry for manure sold....	18.00
	<hr/> \$28.20

Plantation Companies and Other Corporations.

From the stock raised with labor supplied by plantation companies and other corporations, we have received orders and supplied the following plants:

	In seed boxes.	In boxes transplanted.	Pot-grown.	Total.
....		1900	750	2650

Collecting Seed.

The two seed boys have been collecting *Eucalyptus* seed on Tantalus and assorted seed around the city.

Experiment Garden, Makiki.

The two men employed at the garden have been busy transplanting and doing other routine work. The stock raised for the use of plantation companies and other corporations will have to be looked after by the regular men after the end of June, as the fund coming from that source will, by that time, be entirely exhausted.

U. S. Experimental Planting, Nuuanu Valley.

The man has been hoeing and clearing away grass from the trees. More planting will be done as soon as the weather is suitable, the ground being too dry at present for tree planting.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, Hawaii, May 31, 1912.

Hon. W. M. Giffard, President and Executive Officer, and the Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I beg to report on the work of the Division of Animal Industry for the month of May, as follows:

The month of May was characterized by an unusually heavy influx of dogs, no less than thirty-six animals arriving during this period. With the quarantine station already full to overloading, it became necessary to take measures to dispose of these dogs, as it was found impossible to construct additional premises for the first bunch of sixteen animals which arrived on the transport Sherman on May 18th.

Under date of May 7th an application had been received from the chief veterinarian of the 5th U. S. Cavalry, for the establishment of a sub-quarantine station for military dogs at Schofield Barracks. With the arrival of the Sherman it became necessary for this board to take action on the application without delay, and when a delegation of officers, headed by Col. McGunegle, of the 1st U. S. Infantry, called on the acting chairman of the committee on animal industry, it was decided to allow the military dogs to be quarantined under the immediate supervision of the military veterinarians, and steps were taken without further delay for the construction of kennels and enclosures for the accommodation of the sixteen dogs at Schofield Barracks. The colonel, as well as the other officers, gave their personal guarantee that the quarantine would be rigidly enforced and especially owners would not be allowed to handle or to care for their in person, but that regular keepers would be appointed

under the supervision of the military veterinarians. Under these circumstances it was decided to detain the dogs on board the transport while the kennels were being constructed and that the animals should be shipped by train as soon as the kennels had been inspected and approved of by the Territorial Veterinarian. On the following day, therefore, I went to Schofield Barracks, where the frames for the kennels had been put up, but as the wire had not arrived it became necessary to quarantine the dogs, who by mistake had been sent out the same day, in box stalls. On the trip down one of the dogs was lost by jumping out of a window while the train was moving at full speed, and even though the train was stopped and backed up, the dog was not recovered. I have since been assured that this dog, a greyhound, returned to Honolulu and was placed on board of the transport and taken to Manila. This incident, however, shows the danger of shipping dogs to Schofield Barracks unless better precautions are taken to prevent their escaping. This, I have been assured, will be done in the future, and from observations made on a number of subsequent visits of inspections, I believe that the military authorities will carry out the quarantine regulations as stringently as is being done at the board's station in Honolulu.

On the 21st of May the steamship Makura arrived from Sydney with fourteen dogs belonging to a theatrical company known as Lordy's Dog Show. Here again it was found impossible to accommodate so large a number of animals at our station on the Beach road, and as the company was very anxious to give a number of performances here before proceeding to the mainland, application was again made for the establishment of a sub-quarantine station within the confines of the Bijou Theatre. The committee on animal industry submitted the question of the board's authority to take such a step to the Attorney-General, who was of the opinion that it was well within the scope of the board's authority to do so if sufficient guaranty of the enforcement of strict segregation could be obtained. The fact that these animals came from Australia, where rabies is supposed not to exist, operated in favor of granting the application, and when, upon investigation, it was found that two small rooms in the back of the Bijou Theatre were available for the segregation of the dogs it was decided that the animals should be allowed to be quarantined there on the condition that they be kept under constant surveillance of two specially appointed policemen, one of whom was to have charge of the dogs at all times, both day and night. The theatrical company also agreed to put up a bond for the purpose of guaranteeing the payment of all expenses in connection with the quarantining of their dogs.

In the meantime other steamers had arrived, and as practically every boat brought one or more animals, it became necessary for the board to take action on my application for the enlargement of the quarantine station on the Beach road. Under date of May 22, authorization was granted this division to construct

six additional enclosures and twelve kennels, each enclosure to contain two kennels, it being suggested that concrete work be dispensed with and that the kennels instead be elevated some distance above the ground. Authorization was also granted for the furnishing and equipment of the keeper's cottage and for the purchase of burlap awnings to protect the dogs against the heat of the sun. No special amount of money was stipulated for this purpose save that no expenditures should be made other than were absolutely required. As will be seen from the itemized statement herewith appended, the additional cost of enlarging the station has amounted to \$400 up to May 31, and it is estimated that about \$150 will be required to finish the work.

As stated in my last report, the keeper of the quarantine station, Mr. Davenport, resigned at the end of last month, and considerable difficulty was experienced in finding a suitable man to take charge of the place. On May 12 I succeeded in getting another man, Mr. Nathan Haskins, who at that time was at work on the construction of the drydock at Pearl Harbor. Mr. Haskins was very highly recommended as being sober, industrious and reliable, and while I had no authority to offer him more than \$45 per month, he agreed to go to work until the board could decide on more suitable wages for him. I would therefore recommend that he be paid \$65 per month, together with lodging, fuel and feed for one horse, with the understanding that he must live at the quarantine station and give his entire time to the care of the animals and to the maintenance of the station insofar as he is able to do so. It is, however, in my opinion, very doubtful whether one man will be able to attend to the constantly increasing amount of work if the same continues at the same rate as it has done since Mr. Haskins took charge. The care of the dogs alone practically requires his entire time, and when at the same time a number of horses and mules have got to be attended to and the premises and enclosures kept in a clean condition, it seems to be really more than one man can do without working night as well as day. I must, however, say that I have been absolutely satisfied with Mr. Haskins' work during the past month, and I trust that the board will see its way clear to insure retaining him by providing satisfactory wages.

In my report of last month it was recommended that steps be taken to have the proper authorities enforce the dog license act, and that the same be requested to impound and destroy as many stray and ownerless dogs infesting the streets of Honolulu as would be possible. As no definite action was taken by the board on this suggestion, I took the matter up with the sheriff, who immediately promised his coöperation and issued instructions for the dog catchers to begin work without delay. In the meantime I had obtained from San Francisco's Society for the Prevention of Cruelty to Animals plans and specifications for a so-called "lethal chamber"—that is, an air-tight box in which the dog to be destroyed is enclosed and asphyxiated by means of ordinary

illuminating gas. Such a chamber has now been constructed within the yard of the county jail, and the capture of unlicensed dogs has been going on for some time. I expect to be able to report on the effectiveness of this new method for destroying dogs at the meeting of the board on June 10, as the first bunch of dogs will be destroyed before that time.

In order to maintain reliable data in regard to the prevalence of rabies in California, a communication was sent to the federal inspector in charge at San Francisco with a request for all information at his disposal pertaining to this subject. His reply has come to hand and is herewith submitted for perusal by the members of the board. From this correspondence it will be seen that the measures taken by the board for the purpose of protecting the Territory against the introduction of rabies are more than justified by the facts contained in this official communication. Not less than nine human lives have been sacrificed during the present outbreak of rabies in California, and it is estimated by the director of the State Hygienic Laboratory at Berkeley, California, that not less than 3200 cases of rabies among dogs and other animals have occurred within the State during the past two years. To this he adds that the disease is rapidly spreading, and in my opinion there can be no doubt that unless the present regulations are effectively enforced it would be a very simple matter for the disease to gain entrance here. In fact, I have been informed that a dog that passed through here on one of the steamers for the Orient developed rabies before the steamer reached Yokohama and bit his owner. If this dog had been destined for this port we would have had the disease here, and it can only be hoped that the same would have been recognized in time to prevent the infection of the keeper, or the spread of the disease to other animals. From a communication signed by the State Veterinarian it is learned that not less than eight laboratories for the administration of the Pasteur treatment to persons who have been bitten by rabid dogs have been established in various cities of California, among which may be mentioned Berkeley, Los Angeles, Fresno, San Francisco and Sacramento. In case, therefore, the disease should gain entrance here, bitten persons would be removed only from six to twelve days from treatment, dependent upon the departure of steamers. But as one of the human cases of hydrophobia mentioned in the appended correspondence developed the disease in fifteen days after having been bitten, and before the Pasteur treatment was little more than half finished, it will be seen that we are not any too well protected in case the disease should get in here, and it is suggested that the attention of the local Board of Health be called to the advisability of being prepared to administer the Pasteur treatment in case it should become necessary.

An application has been received from Mr. Lordy, the owner of the performing dogs now quarantined at the Bijou Theatre, for permission to perform at Wailuku, Maui, and at Hilo, Hawaii.

In case the board considers it advisable to grant this request I would suggest that it be stipulated that the same two policemen who are now in charge of the dogs here must accompany the troupe and remain in charge of the animals at all times, the same as is now the case. The manager has suggested that in order to save traveling expenses and hotel bills, it might be possible to obtain local police officers at the places visited for the purpose, but I am very much in doubt whether the same would be as effective as a continuation of the men in charge who have become familiar with the requirements of the position. I am further of the opinion that the granting of such a permit would give rise to a great deal of criticism, and it will establish a precedent which may cause inconvenience at future times when similar requests may be made.

The report of the Assistant Territorial Veterinarian on the routine work of the division for the month of May is herewith submitted for the consideration of the board.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT TERRITORIAL VETERINARIAN.

Honolulu, Hawaii, May 31, 1912.

Dr. Victor A. Norgaard, Chief of Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu, T. H.

Sir:—I have the honor to submit herewith a report for the month of May.

Tuberculosis Control.

The work in this line has been confined to testing several lots at different points on this island, and is as follows:

	T.	P.	C.
May 1—Kaneohe Ranch	102	94	8
May 3—Waimanalo Plantation	28	28	0

The number tested at Kaneohe Ranch represents merely what were at that time in the milking corral and a few of the bulls of the main herd which they were able to round up. The final test will be made when they make their drive some time next month.

No test of the entire herd has ever been made on this ranch, last year's test only taking in 100 head, out of which four cows were condemned. This year's test consisted of a re-test of practically the same animals, with the addition of the breeding bulls above mentioned, out of which number eight were condemned, two cows and six bulls.

These condemned animals had all received the test for the first time, a fact which would seem to indicate that considerable disease exists among the main herd. It is a rule, almost without exception, that where the disease exists in a herd, the bulls give evidence of being infected and the disease is, perhaps, more rapidly and surely disseminated through them than through any other means. The results of the test of the main herd will be awaited with interest.

The test at Waimanalo Plantation contains no points of interest. The animals tested were the same as were tested last year, the record being clean for each year.

There is still considerable work remaining before this test is completed, and will be started as soon as weather conditions are such that the animals can be kept up the necessary length of time, which means that there must be a rainfall to put the pastures in condition. A rough estimate puts the number still to be tested at two thousand.

Inspection and Importation of Livestock.

Pursuant to a request from Hind, Rolph & Co. for inspection of stock landed at Honoipu and by order of the Board of Commissioners, I left for Mahukona on the Mauna Kea, May 21. Upon my arrival I proceeded directly to Kohala, and the following day set out to inspect the one stallion, two boars and one Merino ram which had been landed there. The stallion was the only animal of the shipment still confined, as permission for the release of the others had been obtained from the board a week previous. I was able to examine the stallion and the two boars, which were found to be apparently free from any contagious or infectious disease, and were admitted into the Territory. I returned on the Mauna Kea, May 25.

List of Importations.

- May 6—S. S. Siberia (Orient), 1 ct. Jap. games.
- May 8—S. S. Lurline (San Francisco), 1 horse, S. W. Hansen;
2 horses, C. M. Apple; 1 Jersey heifer, W. E. Wall;
12 cts. poultry.
- May 14—S. S. Wilhelmina (San Francisco), 14 cts. poultry.
- May 16—S. S. Korea (San Francisco), 3 horses, 2 cows, 3 dogs,
2 cats, 4 cts. poultry, Mrs. A. Dias.
- May 17—S. S. Sierra (San Francisco), 16 cts. poultry.
- May 18—U. S. A. T. Sherman (San Francisco), 16 dogs—quar-
antined on reservation at Schofield Barracks.
- May 21—S. S. Manchuria (San Francisco), 2 dogs, F. Baldwin—
quarantined at station.
- May 21—S. S. Makura (Sydney), 14 dogs, Lordy Company—
quarantined at Bijou Theatre.

May 22—S. S. Honolulan (San Francisco), 8 horses and 2 mules, E. A. Eames; 1 horse, H. G. Smith; 1 stallion (white three-quarter Arab), D. P. R. Isenberg; 1 ct. rats—quarantined at station.

May 27—S. S. Chiyo Maru (Orient), 4 cts. poultry.

May 31—S. S. Siberia (San Francisco), 1 dog (Skye Terrier), Mrs. F. Martin—quarantined at station.

Respectfully submitted,

L. N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, Hawaii, May 31, 1912.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of May, as follows:

During this month there arrived 35 vessels, of which 20 carried vegetable matter, two carried building sand, and one carried ballast. The usual careful inspection was made with the following results:

<i>Disposal with principal causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	541	8709
Fumigated	30	166
Burned	13	165
Total inspected	584	9040

Rice Shipments.

Rice to the amount of 20760 bags arrived from Japan during the month of May and was passed, after careful examination, as clean and free from pests. Notice has also been given to the several importers of rice to notify their agents in Japan regarding the fumigation of rice at the ports of Japan and not to have any weevily rice shipped here in the future.

Sugar Cane.

On May 11 the American-Hawaiian S. S. Company's steamer Columbian brought a large case of sugar cane and 15 cases of soil from Salina Cruz. This was consigned to Theo. H. Davies & Co., of Honolulu. We were unable to locate the shipment and received the report that it was a short shipment and would probably arrive on the next vessel. However, it seems that the ship-

ment was on the vessel and was taken to Kahului, Maui, and unloaded there and then brought back to Honolulu by the Claudine. We were notified about the shipment through the customhouse, and after entry was made we took possession of the shipment. The agents were notified and told of the law regarding soil and sugar cane, and we then hauled the 16 boxes to the incinerator and remained there until the last of them was burned. We understand that this shipment was sent here for analysis, and that the H. S. P. A. Experiment Station were to be asked to perform the work. I believe that should such be the case it would have been a very dangerous undertaking on account of the possibility of introducing some disease into the station grounds, where material for every plantation in these islands is propagated. However, as the matter now stands, the danger has been removed by the destruction of the sugar cane as well as the soil.

Pests Intercepted.

Fifty-one packages of vegetables and 47 packages of fruit were confiscated from passengers and immigrants during the month, much of which was infested with pests as well as prohibited by law. In the soil around the roots of plants from Japan we found three large larvae of a *Melolontha species*, as well as a colony of ants. On another shipment of plants from Japan we found the following scale insects: *Pseudococcus azaleae*, *Pseudoaonidia duplex*, *Lepidosaphes curiae*, *Parlatoria pergandei* and *Parlatoria proteus*. Some rice owned by a Filipino we found infested with *Tribolium ferrugineum*, a cosmopolitan pest. From beans and acorns in the baggage of the Harpalion immigrants we found the pea weevil *Bruchus pisorum* and a *Curculionid*.

Hilo Inspection.

Brother M. Newell reports the arrival of seven vessels, four of which carried vegetable matter consisting of 84 lots and 1508 packages. One lot of palms was fumigated on account of scale insects.

Inter-Island Inspection.

During the month of May 64 steamers were attended to and the following shipments were passed on:

447 bags taro
10 bags of taro tops
2 bags cocoanuts
1 box sugar cane
95 boxes plants

Total 555 packages inspected and passed.

The following packages were refused shipment:

- 183 packages of various fruits
- 20 packages of vegetables
- 4 packages of plants
- 2 packages of green awa roots

Total 209 packages inspected and refused shipment.

I beg to report that Mr. Arthur E. Carter, inspector of inter-island inspection, tendered me his resignation on May 21. I have temporarily appointed Mr. Robert K. Kanakanui as assistant inspector for the work, pending further arrangements to be made regarding inter-island inspection after the end of June.

Respectfully yours,

E. M. EHRHORN,
Superintendent of Entomology.

REVIEW OF CURRENT LITERATURE.

The Hawaiian Annual, for 1912, contains a number of articles pertaining to agricultural matters. "A Synopsis of the Hawaiian Flora," by J. F. Rock, occupies 10 pages, with 5 illustrations. This article deals mainly with the geographic distribution of the native plants of Hawaii; and the affinities of the Hawaiian flora with those of adjacent regions. "The Present Status of Cotton in Hawaii," by E. V. Wilcox, covers five pages, and gives special attention to local soil conditions, protection of cotton from wind, and selection of varieties. Caravonica and Sea Island are compared, to the favor of the former. Directions are given for the control of the cotton-boll worm. "An Entomological Potomac," by D. L. Mackaye, fills nine pages, and summarizes in a popular manner the various lines of entomological investigation and enterprise that are carried on in this Territory. "The Future of the Rice Industry," by F. G. Krauss, is a succinct forecast, based upon prolonged and accurate observations, both in Hawaii and Japan. Prof. Krauss predicts increased production of Japanese varieties, to suit the demands of our steadily increasing Japanese population. "Volcanic Observances at Kilauea Inaugurated," is the title of a 12-page article in which Mr. F. A. Perrett's valuable weekly reports to the Advertiser have been collaborated and reprinted.

Fruits of the Hawaiian Islands, by Gerrit P. Wilder. Hawaiian Gazette Co. 1911. 247 pp. 122 plates. 10½ x 7¼ inches.

This convenient handbook, the work of one of Hawaii's leading amateur horticulturalists, is very satisfactory from a book-man's

standpoint. It is well-printed on a heavy glazed paper that brings out to advantage the half-tone plates. The plates are the leading feature of the book, and in general are large size and satisfactory in finish. Facing each plate are brief descriptive and cultural notes. One wishes that these notes were more detailed and complete, especially as regards methods of propagation. In this particular phase of tropical pomology Mr. Wilder's unusually wide and varied experience might have been more generously shared with a public that knows very little of the technique of plant propagation. The following genera are treated with special fullness: Jambosa, Eugenia, Citrus, Artocarpus, Anona, Psidium, Passiflora, Persea, Ficus, Chrysophyllum, Carica, Mangifera, Solanum. In all about seventy genera are discussed. In many of the plates structural details of the flowers and fruits are shown. Notwithstanding the brevity of the text, this book is a welcome addition to the scant literature pertaining to Hawaii's horticulture.

The Influence of Molasses on Soil Fertility, in *Agricultural News*, Barbados, Vol. 9, 1910, No. 222, and Vol. 10, 1911, No. 238.

These articles briefly summarize the results of experiments in Mauritius, Antigua, and Hawaii, with molasses as fertilizer for sugar cane, indicating "that the application of molasses to fallow land, or to land in which sugar cane is to be planted after several weeks have elapsed, may have a beneficial effect in stimulating the action of the nitrogen-fixing organisms and thus adding to the store of nitrogen for the crop that will be growing after such a time has elapsed as will have allowed this stimulus to have had its proper effect." In the Antigua experiments the application of 400 gallons of molasses per acre increased the yield of cane 1.2 tons per acre.

Experimental Tappings With Rubber, by T. B. McClelland, Report of the Porto Rico Agric. Expt. Station for 1910, pp. 39, 40; 1 plate.

This reports results of experimental tappings of 7- and 8-year-old Castilla trees, on station grounds, using herring-bone system. Since the cuts heal over very slowly, the herring-bone system is not considered suitable for Castilla. The relative amounts of dry rubber bore no relation to the quantity of latex per tree.

An Important Banana Disease, by S. K. Basu, in *Quarterly Journal of Bengal Dept. Agric.*, Vol. 4, 1911, No. 4.

This fungus disease is said to be increasing to an alarming extent in certain parts of India. The main symptoms are: 1, the yellowing of the older leaves; 2, the formation of one or more much reduced leaves at the crown; 3, the gradual withering of the younger leaves, the final breaking down and death of the plant, which often occurs within 10 or 15 days from the first appearance of the disease. The fungus has not been determined. Clean culture methods are recommended.

The Report of the Entomologist, W. V. Tower, in the 1910 report of the Porto Rico Agric. Expt. Station, contains notes on the guava fruitfly; an ant which is a source of serious injury to coffee; citrus pests; bees and bee-keeping; and the sugar-cane insects of Cuba.

Citrus Fruit Insects, by H. J. Quayle, in Calif. Agric. Expt. Station Bulletin 214, is a summarized account of the more important insect enemies of citrus fruits, their natural enemies, and means of control. Methods of fumigation are briefly described, and the text given of the section of the state law on orchard and nursery inspection.

Another California paper, (Cal. State Commissioner of Horticulture, Circular, 1911, pp. 3-7), calls attention to the danger of introducing the Morelos orange maggot from Mexico, and the melon-fly and the Mediterranean fruit-fly from the Hawaiian Islands, into California.

Ripe and Unripe Bananas, by R. Reich, in Ztschr. Untersuch. Nahr. u. Genussmtl., Vol. 22, No. 4.

In this article, according to a recent Experiment Station Record, "analyses are reported of dried ripe bananas of different sorts, unripe bananas, banana flour, skins from ripe and unripe bananas, and fresh bananas of different sorts. The conclusion is reached that in the case of bananas which are shipped green and then allowed to ripen, the transformation of starch into sugar takes place normally. The inversion of saccharose, however, proceeds slowly under such conditions. It appears further that bananas in which the saccharose content is higher than the invert sugar are to be regarded as 'unripe.' The flavor is flat, and there is little or no aroma."

Breeding and Feeding Sheep, by J. W. Wilson, South Dakota Agric. Expt. Station, Bul. 127.

This bulletin reports the results of six years work, the object of which was to ascertain which of six breeds of sheep, Cotswold, Hampshire, Oxford, Southdown, Shropshire, or Rambouillet, is the best to use on the western-bred ewe, both wool and mutton being considered.

Poultry House Construction and Yarding, by H. L. Kempster. Michigan Agric. Exp. Sta. Bulletin No. 266.

This illustrated bulletin deals with the general principles of poultry house construction.

Practical Poultry Buildings, by H. L. Blanchard. Washington Agric. Exp. Sta., Bulletin No. 4. Special series, revised.

This bulletin is another recent and well illustrated summary of methods and appliances.

Poultry House Construction, by J. G. Halpin and C. A. Ocock. Wisconsin Agric. Exp. Sta., Bulletin No. 215.

In this pamphlet the colony and long house systems are described, and bills of material for different houses are given.

Milk Standards. A study of the Bacterial Count and the Dairy Score Card in City Milk Inspection by W. K. Brainerd and W. L. Mallory. Virginia Agric. Exp. Sta. Bulletin No. 194.

This bulletin discusses the use of the dairy score-card in regulating the sanitary condition of city milk, and reports results of studies to determine the relation between the bacterial content of milk and its rating as measured by the score card, and the value of the bacterial count as a supplement to the score card in city milk inspection.

Relation of Calcareous Soils to Pineapple.

Chlorosis, by P. L. Gile. Porto Rico Agric. Exp. Sta. Bulletin 11.
A chemical study of chlorotic soils and plants.

MECHANICAL RUBBER TAPPERS AND GATHERERS.

The late J. B. Carruthers when at the head of the Botanical Gardens in Trinidad, expressed himself as doubtful of the possibility of planters of *Hevea* anywhere in the Americas competing with those in the Far East. He acknowledged that everything in the way of climate, soil and moisture was ideal in the Guianas, for example, but the labor cost seemed to him an insurmountable obstacle. That is to say, 15 cents a day as against 40 cents for a coolie was enough to make a marvelously profitable business in Malaya unprofitable in Guiana. Were Para rubber to drop to 50 cents a pound and stay there, it doubtless would cause those who are considering planting in the Americas to pause, but such an eventuality is hardly possible for years to come, at least. Plantation Para costs in the Far East, say, 25 cents a pound. In the Guianas it may cost 35 cents, perhaps 40 cents, but even at that it will be a marvelously profitable crop.

Then, again, it must be remembered that labor costs in the East are gradually going up. It is not improbable that with the enormous expansion in planting in Ceylon, the Federated Malay States, Java, Sumatra, Borneo, etc., labor will become scarcer and wage scales appreciate considerably. Then, too, there is the mechanical faculty of the American planter to be taken into account. It is by no means thinkable that the last word has been said upon methods of tapping, gathering and coagulating. With trees set in orderly rows equally distant one from another, who can say that it is impossible to operate mechanical tappers and gatherers that will do the work of hundreds of coolies? When the Yankee gets too far behind in the race for any sort of supremacy, he is likely to discover some short cut that lands him at the goal with the rest. He certainly is far behind in the pro-

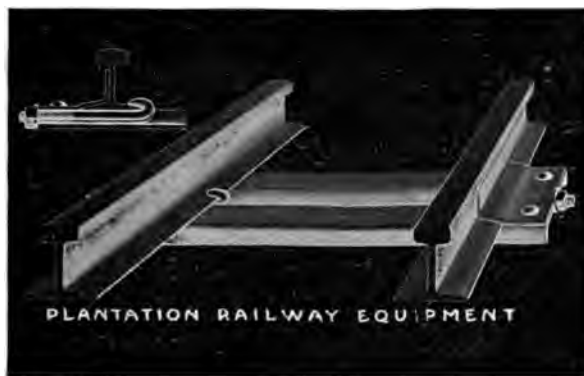
duction of systems of tapping and gathering now. Nearly all the successful ones are of English origin, and are the result of much labor and experiment. To better them is to possess and utilize genuine mechanical genius.—*India Rubber World*.

PRICKLY PEAR FOR WHITEWASH.

The use of the sections of the stem—commonly called leaves of prickly pear (*Opuntia* spp.) in making whitewash is frequently met with in the West Indies.

In regard to this matter, a note contained in *The Colonizer* November, 1910, drawing attention to a similar employment of the prickly pear in Uruguay, is of some interest. It is stated that the white color of the farm buildings in that state serves as a special attraction, even during the wet season.

The mode of employing the "leaves" is stated to be to cut them, macerate them in water for twenty-four hours, and then to add the lime and mix well. The endurance of whitewash made in this manner forms a matter for particular comment.



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JULY, 1912

No. 7

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— THE —

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

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All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

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JULY, 1912.

No. 7.

Recent bulletins of the Hawaii Agricultural Experiment Station are the following entitled: Sisal and the Utilization of Sisal Waste, by E. V. Wilcox and Wm. McGeorge; The Pineapple in Hawaii, by J. E. Higgins; Index to Publications, July 1, 1901, to December 31, 1911, by A. T. Longley.

Mr. David Smith, a fruit and banana merchant of Flinder's Lane, Melbourne, writing on the 30th ultimo, on the banana trade, points out that there is always a good market awaiting Fiji bananas in Melbourne. At present they are practically relying on Queensland for supplies, "and the stuff they are shipping is not worth classing as bananas, being small and very discolored in appearance; however, we have to make the best of them."—Western Pacific Herald.

The foregoing may contain a suggestion for Hawaii to act upon when the Panama canal has been opened.

The Tropical Agriculturist (Ceylon) for May copies from the FORESTER for January the article by E. M. Ehrhorn, Territorial entomologist, "Clean Cultural Practice Method for Fighting Insect Pests." The same magazine has reproduced in two numbers, concluding it in the May, T. H. Gibson's report on the "Course of Study for Elementary Schools," from the FORESTER.

According to Colonial Reports, the cultivation of limes continues to occupy the position of principal agricultural industry in Dominica, and further expansion has once again to be recorded. The crop for the year was 369,000 barrels, an increase of 85,000 barrels over the crop of 1909. This remarkable increase is partly attributable to the coming into bearing of young plantations established within recent years.

A HANDSOME FLOWERING PLANT.

The Agricultural News (West Indies) gives, from various authorities, an account of *Baikiaea insignis*, belonging to the family of pod-bearing plants (Leguminosae) and a specimen of which, it is said, may be seen in the Dominica Botanic Garden. It is

noted for the size of its flowers. The tree reaches a height of about 60 feet; it is provided with short pinnate leaves which bear very stiff, naked, large, elongated leaflets which are often alternate: there may be two or three pairs, or only one. The white flowers are in short racemes, and are among the largest and most splendid flowers of the Leguminosae. The thick calyx is provided with velvety hairs, and is more than 3 inches long; the petals are broadly oblanceolate or inverted egg-shaped spatulate, and reach the considerable length of over 6 inches.

The account goes on to say that this beautiful flowering tree was discovered originally in Fernando Po (in the Gulf of Guinea), and among much additional information, states that it has also been collected near Lolodorf (in Kamerun), where it was found as a bushy tree 36 to 60 feet high, with a brownish-grey bark, glassy, bright-green leaves, and a not very hard wood. A very similar plant to *B. insignis* is *B. minor*, which only differs in the possession of smaller flowers and more pairs of leaflets.

RABIES IN CANADA.

Rabies, precautions against which here some people hastily flouted at, would appear to be taking a world range this year. In a previous number the FORESTER told of its appearance in the Philippines and of the steps taken for its repression there. Dr. Norgaard in his last month's report gave information of cases, one at least fatal, in California. Now comes news of a fearful visitation in Canada, with some dire results, contained in the following press dispatch:

Goderich, Ont., June 20.—A serious outbreak of rabies has developed in Goderich township where cattle have been infected and died in great agony. Some two weeks ago a steer on the farm of Mrs. Joseph came home acting rather peculiarly as if affected with some form of paralysis. A local veterinarian was immediately summoned, but did not consider the trouble serious.

However, the affliction of two more of the cattle a day or so later gave fears that something was wrong. Government veterinaries from Toronto and Ottawa were summoned, who, on investigation, pronounced the disease to be rabies.

Some six cattle of the farm have since suffered most agonizing deaths. Two rushed to the lake and were killed as they hurled themselves over the bank.

Two sons and a daughter of Mrs. Salkeld, who had assisted in treating the cattle, have gone to Toronto for the Pasteur treatment. Farther east in the country, Reginald Sturdy, aged eighteen, was attacked by a dog, on Tuesday, and in attempting to fight it, received several bites, the flesh of one hand and arm being literally torn off. The dog escaped and several search parties have failed to locate it.

The board of health has issued a proclamation that all dogs must be chained up or muzzled for thirty days.

SAW GINS VERSUS ROLLER GINS FOR CARAVONICA COTTON.

By C. K. McCLELLAND, Federal Experiment Station, Honolulu.

There has been some uncertainty among the various producers of Caravonica Cotton in Hawaii as to the advisability of ginning the cotton upon saw gins thinking that the fibre might be injured by so doing. Roller gins of equal capacity as small saw gins cost several times as much. At the Experiment Station we have the smaller types of both the saw and roller gins, and the saw gin, which cost less than half as much as the roller gin, has a capacity of about five times as much lint per hour, representing a saving in the cost of the machine, of labor, of gasoline, and of wear and tear upon the engine and gin. In order to find out if the claim "that long staple cottons should be ginned upon roller gins" held true for Caravonica cotton, we submitted samples to the Wonolancet Company of Nashua, N. H., for test. They have reported as follows:

	Saw-ginned cotton.	Roller-ginned cotton.
Amount received	261.4 lbs.	414.12 lbs.
Picker room returned . . .	248.6	394.12
Loss	12.8	20.
Loss in per cent.	5.27	4.83
Card room returned . . .	236.5	384.
Total loss	24.87	30.12
Total loss in per cent. .	9.12	7.27

The comparison was carried no further, as the company claimed that practically all the broken fibres would be eliminated in these two steps.

The company say that the roller ginned cotton with a loss of 7.27 per cent. is about equal to Peruvian which loses 7.25 per cent. They also say that it is about equal to Peruvian in roughness, and consequently is of equal money value. They allowed us 18½ cents a pound for the roller-ginned cotton, that being the current price of Peruvian at that time; but on account of the greater loss in the saw-ginned cotton they allowed us but 18⅔ cents for it. The transportation amounted to about 1.45 cents per pound.

This report shows but very little difference between the two methods of ginning, but when the relative costs of ginning are considered, the difference will be found to be somewhat in favor of the saw-ginning. And, furthermore, the company submitted samples to the U. S. Department of Agriculture at Washington for strength tests, and after the final stage in the preparation of the cotton for yarn the breaking strength of the saw-ginned cotton was found to be 9.36 grammes as against 8.19 grammes for the roller-ginned.

The company offer the very likely reason for this difference by saying that probably the weaker fibres only have been broken by the saw gin, which when removed in the above processes leave the saw-ginned cotton with a higher average strength than has the roller-ginned.

It might be well to add here, however, that only in case the ginning is very carefully done upon the saw-gin is such a small difference likely to be shown. To do as little damage as possible to the cotton it is necessary that the gin be run at a lower rate of speed than the manufacturers have recommended since in their recommendation they were thinking of short staple cotton. The higher speed would give a greater capacity to the gin, but it might result in greater damage to the staple.

*PARASITES OF INSECTS ATTACKING SUGAR CANE.**

BY R. C. L. PERKINS.

In this Bulletin is described a number of very minute parasites, nearly all of which were bred from eggs of insects attacking cane in countries other than these islands.

The American species were obtained by Mr. Koebele, when investigating insects in the cane fields in Mexico, where he spent a short time during the winter months of 1908. All the rest were obtained by Mr. Muir in Fiji, China and the Malay islands. Many of these parasites are of great interest and importance, since they are important agents in limiting the numbers of injurious species which, if introduced into the islands without their parasites, would be likely to cause great loss to the sugar plantations. It has been advisable, therefore, to work out these insects and put them on record, so that in the event of any of the species which they attack turning up in the islands, information would be at hand as to where to look for natural enemies without delay. Although there is now a regular inspection of all imported plants and, without doubt, the vast majority of injurious insects is intercepted and destroyed, yet there are means of introduction which no inspection can provide against. Also there are some insects which are liable to be passed over by the most shrewd inspector and against which treatment by fumigation is ineffective. We know that in spite of the fact that there has been a systematic inspection of introduced plants for nine years, during the last few years numerous insects have appeared and become abundant. Because this is the case there is no reason to regard inspection as futile, for as has been said, there is no doubt that the majority of imported species is thereby prevented from becoming established. With the opening of the Panama canal and with quick

* Report of work of the Experiment Station of the Hawaiian Sugar Planters' Association. Introduction to Bulletin 10, Entomological Series. (Printed by permission H. S. P. A. Experiment Station.)

steamers from Central America we may safely predict that an entirely new lot of insects will be brought here, and that the duties of inspectors will become still more onerous. Many of these insects will be particularly dangerous, because we know that species from the warmer parts of the American continent readily become established and thrive here, whereas the native insects of California, though they have often been brought here, generally fail to establish themselves. This climate is evidently not suited to them. Although cane is no longer imported into the islands, yet many bad cane pests are by no means restricted to cane, but may easily be brought with other plants. It is well known that steamers have put in here from Fiji carrying cane on board, from which insects might easily have escaped to the shore, although such cane is not landed. It is also known that both on cane and on other plants, carried on deck, insect pests are frequently numerous. Mr. Muir has observed this to be the case with sugar cane carried on deck from Fiji, and Mr. Koebele and myself noticed great quantities of fruit fly maggots dropping from fruit carried on the deck of steamers, when we were traveling along the Australian coast. These fruit-fly maggots were crawling into cracks of the deck and pupating there, and some would certainly be likely to hatch out and gain the shore at other ports. Quick traveling steamers may carry even mature insects an enormous distance, so that they reach new countries by flight, when in or near port. Mosquitoes were still seen on board the ship on my last journey to San Francisco, five days after leaving Honolulu. On another journey numbers of a Chinese moth were seen about the decks the whole way to San Francisco. It would be very difficult and probably impracticable to keep such things from becoming established in a country suitable to them.

FREE LITERATURE ON PINEAPPLE CULTIVATION.

There is a great demand for pineapples in the world, and on account of the keeping qualities of the fruit the advantage in transportation is important. When cut at the proper time and carefully handled the fruit will reach the United States and European markets in good condition.

In our country the proper soil conditions for this cultivation can be found, and our proximity to the large American markets assure the cultivation of this aromatic fruit a profitable investment.

The General Department of Agriculture has recently published an excellent bulletin which treats on the "Cultivation of Pineapples in Porto Rico," written by the horticulturist of the agricultural experiment station on said island. This bulletin is for free distribution and can be had by addressing General Agricultural Department.—*Review of Tropical Agriculture* (Mexico

NOTES ON FOREST INSECTS.*

The Hawaiian forests are inhabited by a very large number of species of insects, most of which are so hidden and of such inconspicuous appearance that the forest region appears to be tenanted by very few kinds to people who have not paid particular attention to the habits of the creatures. Very few of the native insects do such damage as to be considered injurious, and at the present time very few imported species have caused any considerable destruction of forest trees. Consequently it may be said that the Hawaiian forests are probably more free from injurious insects than those of most, if not any, other parts of the world.

It is in many cases extremely difficult even for a trained entomologist to decide on the exact status of an insect found in connection with dead, dying or diseased timber. Such timber is always very attractive to many kinds of creatures, and the outsider observing these to be abundant, almost invariably attributes to them damage which has been brought about by quite different causes. Many of the insects supposed to be injurious in such cases are really highly beneficial, for they perforate and break up the dead wood, allowing water to penetrate to the heart of the timber and hasten decay, so that even a hard-wooded tree may be rapidly converted into humus. Further, in the case of old and diseased trees, the attacks of insects, that are partial to these, hasten the death of the tree and make room for younger and more healthy growth. There are, however, cases where, owing to various causes, a temporarily unhealthy condition of the forest is induced, and trees so affected are readily attacked by a number of species of insects. This may result in the actual death of trees, which, if unattacked, might fully recover. The commonest cases of this kind that we have observed in the islands are primarily due to the interference of man. For instance, such attacks commonly follow after a forest fire, trees slightly scorched often becoming badly affected by insects; forests where previously there has been a dense or uniform growth either of the trees themselves or of the undergrowth, and consequently a great retention of moisture, when opened up by cattle or by thinning and so rendered much drier, are very liable to attack, because many of the trees suffer from such change of conditions. That this is true is readily seen from the fact that in virgin forests, never entered by cattle, one never observes this great multiplication of individuals of species that attack the timber, and it is possible to search for days in such forests without finding a single individual of such species. It is a well known fact that the Hawaiian forests are singularly susceptible to any interference with the natural conditions—in fact, to an extent that is rarely, if ever, seen in the case of forests of other countries. This is perfectly natural, when we consider that they have developed under conditions very

* By Dr. R. C. L. Perkins. (Printed by permission of the Hawaiian Sugar Planters' Experiment Station.)

unlike most other forests, having been originally free from the effect produced directly or indirectly by the larger animals. Owing to the work originated for scientific purposes by a committee of English societies, aided by the trustees of the Bishop Museum, it is probable that the habits of the forest insects of these islands are better known, and have been more studied, than those of any other tropical country. In the following account not only actually injurious insects will be referred to, but also others which are frequently, but erroneously, supposed to be injuring the native forests.

The insects, to which damage is attributed most commonly in the case of the island forests, are generally spoken of as "borers" by those interested. In most cases the "borers" referred to are the larvae of large or moderately large beetles. There are, however, many small kinds of borer-beetles; in fact, these are far more numerous than the larger ones, though they escape observation from their diminutive size. Besides the beetle-borers, there are also a large number of other borers, especially the larvae or caterpillars of small moths. These are usually found in or beneath the bark of trees which have advanced to a further stage of decay than is attractive to most of the large beetle-borers, while quite decayed wood is often perforated through and through by various species of myriapods, creatures somewhat resembling small centipedes, but with the legs much more numerous.

Of the large beetle-borers three types are most conspicuous. All the larvae are white or yellowish grubs, most of them with-



FIG. 1

out legs, but two kinds have three pair of very minute legs, one pair on each of the three segments of the body following the head. The largest of these produces the beetle (*Aegosoma re-flexum*) here figured with its larva (Figs. 1 and 2), and it can



FIG. 2

not be mistaken for any other Hawaiian insect. It is not at present known from elsewhere, though very similar species are found in other countries. This beetle is remarkable for the diversity of its habits. The grub feeds sometimes in the wood of the hardest forest trees, generally in dead trees, but sometimes in those that are apparently healthy—e. g., in living trees of “Naio,” the bastard sandal. On the other hand, it breeds freely in old decayed tree trunks or smaller logs, that are sometimes so rotten that they can be pulled to pieces by the hands, and so wet that the water can be squeezed from them as from a sponge. This species is found throughout the forests of all the islands. In some localities, where forest land has been cleared for raising cane or coffee, the beetle persists for some years. On Maui we once found numbers in cane fields, where they lived beneath the soil, boring through the stools and doing some damage. In Olaa, when coffee was being grown in that district, many trees were injured by being cut through or perforated beneath the soil by these large grubs. The latter and the beetle itself vary much in size, so that some of the adults are not more than half the size of others. The beetles are attracted by light at night and so are sometimes captured as curiosities, but otherwise they are much less frequently noticed than the larvae.

The only other large borer grub, which possesses the minute legs referred to, has very much the habits and appearance of the preceding. It is very partial to dead or partly dead Koa trees, but is found in other trees—e. g., the Kopiko and Koolea, and also in quite rotten logs that lie upon the ground. It is doubtful whether it ever attacks the living parts of apparently healthy trees, as the preceding does. The mature beetle is a large, dark brown, flattish beetle, found beneath bark in the forest and attracted by light at night. The male has very large, prominent jaws, like those of some stag-beetles. Its name is *Parandra puncticeps*, and it is peculiar to the islands.

The borer beetles, whose work is most commonly noticed by the non-entomologist both on cattle ranches and in forest clearings, form a group (with many species) which is quite peculiar to the Hawaiian forests. The mature beetles are of extraordinary

appearance and have a superficial appearance of some crickets rather than of more ordinary beetles. The species figured (*Platymysus darwinianus*, Fig. 3) is one of those that attack the "Mamani" on the Island of Hawaii. The larvae of these beetles much resemble the borers previously mentioned, but are easily distinguished by the absence of the small legs on the three segments of the body behind the head. Owing to the fact that numerous species attack the two common and important forest trees, the Koa and Mamani, and that their work is so conspicuous on the dead trees when the bark falls off, many complaints as to the injury done by them to the forest have been received from various localities, but more especially from the upper forest country of cattle ranches on Hawaii.

The cricket-like beetles referred to in the previous paragraph (fig. 3) which are so often reported from the forests as injur-

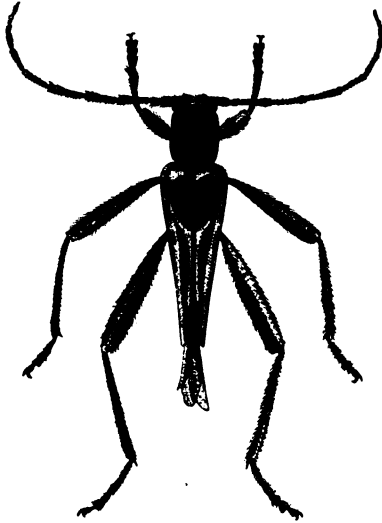


FIG. 3

ing the trees, are not only of interest from their peculiarities of structure, but also from their habits. Nearly all the known species described and undescribed (which at present exceed 50 in number) attack, each one, only one kind of forest tree. The exceptions to this rule are very rare. Some trees, like the Koa, Mamani, Alani and Mamaki, have several or many species that feed on them, but a good many native trees have never yet been found subject to their attack. Other trees commonly affected by these borers are the Ohia, Ohia-ha, Ahakea, Aiea, Naeo, Heae, Akoko, Koolea, Opuhe, and others more rarely. The stems of the Akala are also bored by one species. There is no doubt that, injurious as these borers appear to be, very few of them will attack trees that are in a really healthy condition. As soon as a tree is in-

jured in any way by fire or axe, by drought or by exposure of the surface roots to a hot sun from destruction of undergrowth, by defoliation from swarms of caterpillars or from natural decay, it is liable to be attacked by the special kind or kinds of these borers that affect it. By the outsider the work of the borer is usually noticed after the death of part or the whole of the tree, when the borings beneath the bark and the numerous exit holes of the beetles become obvious; but those who are observant may notice the beetles themselves running rapidly in the sunshine over the trunks and branches of still living trees. At night and on wet days they usually remain hidden in the undergrowth. If held in the hand, they squeak audibly, and some of them have no less than three different sets of sound-producing apparatus. A few appear to be found in apparently healthy trees and not to particularly injure these, since they produce abundant seed annually in spite of the attack. These beetles are so rarely found in forests that have not been interfered with by man and his animals, that it is quite certain that, in a natural condition of the forest, they are beneficial rather than injurious insects, as they help to remove old and sickly trees and make room for younger growth. Two parasitic wasps attack the larvae of these borers, and in some cases cause a great mortality. In the case of one species, of more than one hundred larvae collected, only two produced beetles, all the others yielding parasites. One species of the latter is a comparatively recent introduction, the other, though doubtless an accidental importation, has been known for more than thirty years. On Maui a very remarkable native bird (*Pseudonestor*) exists, which is peculiar to that island, and is specially formed for securing the larvae and immature beetles of these borers. On many occasions its food was found to consist solely of these, and the number destroyed was remarkable. Other native birds that are allied to the *Pseudonestor*, and which are seen in the same trees, feed on other species of borers, but either are not able to obtain this kind or else they have no liking for them. It is a matter for surprise that, excepting on Maui, none of the common native birds with woodpecker-like habits should have availed themselves of such a food supply.

In Figs. 4 and 5 are shown two small weevils much magnified, since they do not exceed one-quarter of an inch in length or are still smaller. Fig. 4 is a species of *Dryophthorus*, of which there are many different kinds, black and reddish in color, small dirty-looking insects, often smeared with excretions and adherent particles of rotten wood. They are frequently extremely numerous in dead trunks or branches of trees and also in rotten logs lying on the ground. Many individuals associate together, and these companies frequently consist of several different species. None of the species can be considered as at all injurious to the forests, though they are sometimes supposed to be so by those who have not studied their habits. On the lowlands one species, which is no doubt an introduction, does much damage to boards, if they



FIG. 4.

are left lying on the ground, especially in damp places, where it perforates the wood in all directions. These beetles appear to be very rarely attacked by parasites, but some of them are freely eaten by native birds. Fig. 5 shows one of the more or less



FIG. 5

metallic or brassy weevils (*Oodemas*) that are quite peculiar to the islands, and occur in all forests. They never attack healthy wood, and rarely that which is not entirely dead, so that any supposition that they are the cause of the death of trees or their branches is erroneous. Many other small native beetles are also found in connection with dead forest trees, but none of these can



FIG. 6

be considered of any economic importance. Fig. 6 is a representation of a very minute beetle, about one-eighth of an inch in length, much magnified. This borer (*xyleborus pubescens*) belongs to a family notorious throughout the world, but especially in colder countries, for the injury that is done by its members not only to forest, but also to shade and fruit trees. To the same genus belongs the so-called "shot-borer" of the cane fields in the West Indian Islands. There are many species of these "shot-borers" in the forests, most of them being indigenous and apparently doing no harm, since they only attack very unhealthy trees, while others like the one figured attack trees, which, if not perfectly healthy, at least would be likely to recover, but for the borers. On one occasion a forest fire in the mountains of the Waialua district of Oahu slightly scorched many large Koa trees, which would almost certainly have recovered had they not been attacked by this common shot-borer, which rapidly increased to many millions in the area of the fire. On another occasion the Halapepe trees, once numerous in Nuuanu valley, were attacked by another species, almost every tree being riddled with its borings and many trees were killed outright. Closely allied to the shot-borers are other still more minute beetles (*Hypothenemus*) which are occasionally injurious in the lower forest, and one of the species is notorious from the fact that it attacks the alligator pear trees and becomes very numerous. It is questionable, however, whether the trees, so attacked, have not first become diseased. The smallest species of all (*H. cruditus*) is not only numerous in the lower forests and on the lowlands, but sometimes is found in houses, boring into the covers of books or other material. This species is occasionally attacked by a very minute parasite, but, generally speaking, all these small borers are free from parasites.

Very similar to the shot-borers, but rather larger than most of these, is another borer (*Crossotarsus externedentatus*) which is also found very numerous in alligator pear trees, often in company with the former. It is easily recognized by the different structure of the legs and the remarkable form of the wing cases,

which end in an acute point on each side, and leave the tip of the body exposed to view.

Though not injuring the trees themselves, mention must be made of a curious weevil, of remarkable form and sculpture, which first became injurious in Honolulu in 1900, having, no doubt, been imported with ferns, somewhat previous to that date. On the settlement of Pacific Heights it must have been carried up with ornamental ferns, and it soon spread along the ridge, attacking the native tree-ferns. By 1902 it had become extremely numerous and injurious over a limited area, and is slowly spreading across the mountains. Being without wings, its progress is naturally slow, as compared with a flying insect. This borer is only known elsewhere from Australia, and was described under the name of *Syagria fulvitarsa*.

(To be continued.)

SEA ISLAND COTTON IN HAWAII.

One difficulty which has been experienced in growing Sea Island Cotton in Hawaii is that of excessive yield, which results in a too prostrate form of growth.

In one locality on the windward side of Oahu, where the rainfall is about 70 inches per year, two acres of Sea Island cotton required about 5000 props in order to keep the branches from lying upon the ground and causing the bolls to rot. In this respect the Caravonica cotton is superior to Sea Island, since it invariably has an upright habit of growth. The difficulty experienced with the prostrate habit of the Sea Island can be appreciated from a consideration of the fact that, in the two-acre field just mentioned and in another one-acre field, on the leeward side of Oahu, the average number of bolls per plant was 700, and on one tree 1200 bolls were counted at one time. This produces a weight under which the slender branches of the Sea Island can not support themselves in an upright position.

An elaborate series of pruning experiments is now being carried out with the idea of learning a method by which an upright growth can be induced in the Sea Island cotton, at least for the second and subsequent years of the crop. Some promise is already held out by these experiments. A strain of Sea Island, secured from one of the best plantations of James Island (South Carolina) shows a more upright habit of growth than any other strain of Sea Island which has thus far been secured.—*Agricultural News* (W. I.).

PINEAPPLES AND DIVIDENDS.

While pineapples are probably grown with more profit in the Hawaiian Islands than any part of the world, it is only because the planters have studied this product, and applied to it the most adaptable methods to produce a finely matured fruit. And the result has read something like a fairy story from King Midas; the profits have even astonished the planters who were interested in the estates growing pines, and ten years previous to their first big crop in 1902, you could scarcely get a Hawaiian planter to look at a pineapple. It was because a longheaded man, then secretary of the Planters Association of Hawaii, told that body of men that some day their sugar crop (which is the principal product of the Islands) would fail. Then what would they have to fall back on, except small crops of coconuts, rice and bananas, which would not tide them over to another season. Some of the members sat up and took notice. Immediately all the information and samples possible were obtained from the other pineapple-growing countries of the world. Companies were formed, areas planted with different species, and the authorities established an experiment station, where a scientific study of pineapples was conducted. The outcome has been a most delicious and healthy fruit which is gaining a famous reputation around the world. The renewed interest in the pineapple situation here begins to look as if the subjects would be taken up seriously before long, and investigated with a view to undertaking the pineapple project on a substantial scale. While most of the planters of Ceylon have rubber to fall back on if tea should fail, and *vice versa*, at the same time, inter-planting has seen its best day, and even now many of our largest planters are contemplating its abolition as a method conducive to producing either better tea or better rubber, each planted separately. Some of the planters will eventually devote themselves to one or the other exclusively. In any event, both rubber and tea crops are subject to ravages by droughts, pests and storms, while the pineapple, hardly and easily cared for, grows low, and is in nine cases out of ten, a sure crop.

That the pineapple is to be one of the principal fruit productions of all tropical countries is exemplified in the reports of the agricultural departments from Japan (covering Formosa), the Philippines, Java, Cuba, Puerto Rico, Panama, Florida, Mexico, Southern California, parts of India; and experiments are even going on in certain districts of British South Africa. At first the problem of shipping from Ceylon seems a difficult one; but when it is considered that the pineapple can be shipped, partly ripe, and by the time it reaches its destination, is in the pink of condition; also when the shipments are once under way, and kept going, the transportation question shrinks into insignificance. Another point in favor of growing pineapples is that first class, finely matured fruit always brings a good market price, and the

demand is invariably strong. Second and third grade fruit finds a ready market for preserving and canning purposes in all of the big world centers. One large canning factory in New England last year offered to contract for, and take all the pineapples which Cuba, the Philippines and Hawaii could raise together. And they all refused to make contracts, for the individual market demand was so great that they could afford to be independent. We are glad that our government officials are looking into the matter, for we have faith in Ceylon as a future pineapple country, and if our planters can produce as fine a grade of this fruit as of tea and rubber, it is our prediction that within ten years we will be running Hawaii a close race for first position. Once the pineapple industry is started on a proper scale, and handled judiciously, there is little doubt as to the profits and certainty of crops. Dividends of from 40 to 60 per cent. on common pineapple shares are reported from Honolulu last season, and many of the Cuban companies paid as high as 50 per cent., which is an excellent showing in consideration of the quality of Cuban pines as compared with those grown in Hawaii. We have recently received several interesting letters with regard to pineapple growing, and some definite action will no doubt be taken soon, as to a further investigation of this subject.—*Tropical Agriculturist*.

GIANT ALOE AT KEW.

On one of the lawns near the cactus house at Kew there is now a magnificent example of the pulque plant *Agave atrovirens*, from the Ilanois or plains of Apam, Mexico. For many years this plant has been a striking object among the many species of agave cultivated in the cactus house, its age being about thirty years. Until the pole-like flower spike commenced to develop there was ample head room in the house for the plant, huge though it is; but when the spike reached the roof, the end of the house was removed and the plant run out on planks and rollers to its present position where, unless the weather of the next few weeks disagrees with it, the flower spike should be at its best towards the end of June. At present the spike is about 12 feet high and 6 inches in diameter, but, judging by a specimen which flowered about twenty-five years ago, it should attain a height of 25 feet, with numerous branches arranged candelabra fashion, and bear a large number of yellow lily-like flowers. The leaves are arranged in an enormous rosette about 12 feet in diameter, and they are about 8 feet long, 10 in. wide, very thick and solid, their color glaucous green, their margins clothed with short spines, and the apex armed with a long sharp spike. In a broad sense this is one of the American aloes or century plants, whose life period varies from ten to fifty years, or even longer, according to circumstances, but they

ALL FLOWER ONLY ONCE AND THEN PERISH.

A. atrovirens is of exceptional economic interest, as from it is prepared the fermented drink called pulque, the favorite beverage of the Mexicans, who cultivate the plant on an extensive scale for the sake of the sweet sap which it secretes when it has arrived at maturity and is about to flower. The sap is obtained by cutting off the top of the flower stalk at any early stage and hollowing out the stem to form a cup into which the sap flows, and is removed several times each day until it ceases to run. The sap is then placed in bull-hide vats to ferment, a kind of yeast being added to hasten fermentation, the entire process resulting in the end in a variety of wine, resembling in color and general appearance the *weissbier* of Germany. It is an agreeable wholesome drink, being a valuable nutrient as well as a mild stimulant, as it contains from 4 to 8 per cent. of alcohol. Pulque is said to be good for inflammatory and catarrhal conditions of the bladder and kidneys, and to be an almost unfailing remedy for what is known as Bright's disease. It is now prescribed by American physicians, who even send their patients to Mexico to drink fresh preparations of it, as it is liable to secondary fermentation a few hours after it has been made, which renders it unwholesome.

There are countries in the British Empire where the conditions of soil and temperature are such as would favor the growth of this agave; for example the plains round Johannesburg, where, to those engaged in the mines, a plant that yields both wine and medicine and requires practically no cultivation would be a blessing. There is a useful fibre also in the leaves of this plant, not so good perhaps as sisal hemp, but good enough for many purposes. If once established in a country this agave would reproduce itself naturally, and most likely with great prodigality, by means of seeds and stem bulbils, which it bears in profusion. Of course it might prove a nuisance by providing a cheap intoxicating drink to natives, thus reducing their value as workers. It is worth trying on a small scale, anyhow.—*Field*, April 13.

“THE LARGEST PIECE OF RUBBER.”

In our last issue we asked if any of our readers knew of the largest piece of raw rubber on record. We referred to a biscuit weighing 559 pounds, which was exhibited at the Rubber Exhibition of 1908, and also to a block which figured at several tyre exhibitions, and weighed about 8 cwt. This week we are enabled, by the courtesy of the St. Helen's Cable and Rubber Co., Ltd., Warrington and London, to publish a photograph of a piece of Fine Hard Para, which they bought about five or six years ago. This block weighed nearly half a ton, to be exact 1100 pounds, and was shown at several exhibitions about the country. It is claimed that this is the largest piece of rubber ever imported.—*India Rubber Journal*, April 20.

POSSIBILITIES OF RUBBER PRODUCTION.

"West Indian rubber planters have awakened to the fact that quite a number of their trees, believed to be pure *Hevea Brasiliensis*, are hybrids. This has caused the planters not a little distress, because these particular hybrids are much less productive of good rubber than the pure *Hevea*," says the *India Rubber World*; "but it serves once more to bring up the general subject of hybridization, with its natural suggestion of the possibility of such hybridization, or cross fertilization or grafting, as will enable some variety of the rubber-producing tree to be grown in the more southerly sections of the United States.

"It is doubtful if a botanically pure *Hevea Brasiliensis* actually exists. There are twenty varieties of the *Hevea* along the Amazon; there are seven or eight varieties of *Manihot* in the most easterly part of Brazil; and of *Castilloas* there are, north of the Amazon, probably twenty different varieties. Which of these many varieties represents the pure parent stock—if any of them does—it is impossible to tell. Hybridization seems to be the general law in the rubber family, and if it could be directed in such a way as to produce a rubber tree capable of withstanding such temperatures as we have in our more southerly States, a vast field for rubber planting would be opened at once.

"The advantages of such rubber planting are too obvious to need enumeration. The most conspicuous may be referred to in a few words—the utilization of great tracts of land now practically going to waste; the easy solution of the labor, provision and sanitation problems that are so difficult in the Amazon country; a great decrease in transportation charges; freedom from exacting duties. All these and many other advantages point to the great desirability, if practicable, of rubber growing in our own country.

"On the face of it, it does not seem necessarily impracticable. There are several plants indigenous to the United States that are quite closely related to the varieties of the rubber tree. Our ordinary milk weed, of which there are some fifty different kinds in the United States, is a cousin of the *Hevea Brasiliensis*, and some of its varieties, particularly those in Florida, that attain the size of a tree, bear something of a family resemblance."

WOODLOTS ON FARMS.

"Growing a Woodlot from Seed" is the subject of an article in *American Forestry* for June written by J. A. Ferguson of the University of Missouri. Part of it deals with this very subject Mr. Cox has mentioned, and says:

"Every farm should have a woodlot to furnish fuel, fence posts and other wood material needed. Especially is this true in the less wooded regions like the prairies, where wood products must

often be transported long distances at considerable expense. Nearly every farm contains some land that is too poor for raising crops or that is not available for grazing or other purposes, which usually lies idle year after year. This land is a burden to the owner because it brings in no returns, yet must bear its share of the taxes. Such land ought to be devoted to the raising of forest trees. When we consider that an acre of land planted to fast-growing trees will produce from one to three thousand fence posts in twenty years, and that with some species fence posts can be secured in less than ten years, a farmer, by allowing waste places to stand idle, is losing a return he could secure by a slight effort. It is not a difficult matter to start a woodlot, neither is it an expensive one. It can be done without any cost to the owner except the time and effort necessary to grow and plant the trees.

"One reason why farmers do not start forest plantings is because they believe large trees are necessary which can be purchased only at considerable cost. The best trees for starting a woodlot are one-year-old seedlings, which can easily be grown from seed by the farmer himself. Every farm should have a forest nursery for growing trees for starting forest plantings. Such a nursery can also be used to grow larger trees for planting about the house, along the roads and for making windbreaks. It should be located on well-drained fertile soil such as might be selected for a garden. Where the space can be spared a portion of the vegetable garden makes an ideal nursery site. The soil should not be made excessively rich, as too fertile a soil will produce a rank growth in the seedlings, making them difficult to handle in transplanting."—*The North Woods* (Minnesota Forestry Association).

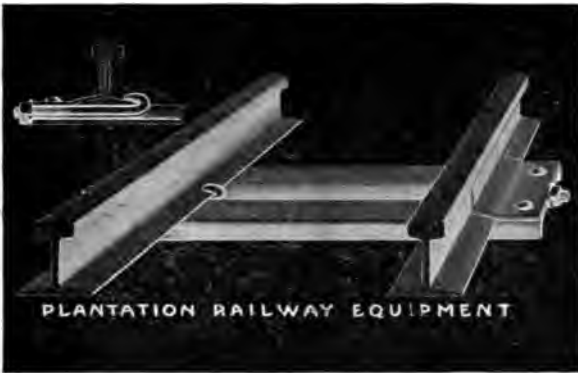
RELIGION OF THE WOODS.

Tribute to the presence of God in the woods, recently was paid by Rev. George R. Gebauer, pastor of the First Unitarian church in Duluth, while delivering a sermon on the subject, "Influences." The following pretty eulogy of the stars and woods and the sermons they preach, came from him:

"It was none less than the great Kant who said: 'The two things which most overawe me are the starry heaven above and the moral law within.' He said nothing of any relationship between the two, but to me there seems to be such. I am convinced that if only we would take our children into the star-lit silence of the night, and in the presence of this visible Infinite speak to them of the Infinite and the eternal law of goodness, we should find them much more receptive than in our Sunday schools with their sanctimonious trimmings. What the stars preach to us is truly 'heavenly,' and the sweet influences of the Pleiades creates a reverence which holy scripture will hardly give in such rich and pure measure.

"It is wrong to speak of a dead world of matter, if thus the very stars speak to us. No, this is not a soulless universe and Arcturus and Vega, and the farthest nebula are filled with the divine soul and try to draw us upward. And as the stars preach to us, so does the earth; nature about us uplifts the sore and troubled soul. The woods and the hills say to us, when we come with fevered brow from the daily pursuits, as Emerson puts it: 'Why so hot, little man?' Yes, it is nature that tells us that man is more than a dollar-earning or dollar-grasping animal, and that his life may be measured by something else than the capacity for making money, and wasting wealth. Yes, life in the end is only true life when it is close to nature; a life is only full when it can look in reverence up to the stars and love nature as a divine mother.

"I think it would be a blessed thing to close for the summer not only the school, but the churches, and turn the saints and sinners to pasture, if people would only forget themselves there. How it might expand those shriveled souls, the souls of poor over- and under-formed humanity, of pale-faced, gospel-ridden churchgoers, of miserable sermon-crammed sinners, simply to go into the woods and become saints and sinners and reformers and 'such like.' Not that we do not need the prophets and preachers, but that it is well to get away from them for a time."



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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Kauri, various species of Eucalyptus, Golden and Pink Showers, Pride of Madeira, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

AUGUST, 1912.

No. 8.

This is the "Annual Reports" number of the Forester and Agriculturist, containing a resume of the work of a year in every division of the Department of Agriculture and Forestry by its chief. It should be preserved for reference by all subscribers, although it is to be hoped that few fail to preserve all numbers of the magazine for adding to their libraries in bound form.

The bureau of agriculture of the Philippine Islands is taking up the culture of date palms, and among other things is planning to plant 150 at Lamao experiment station to form an avenue of these palms to be known as Eden avenue. This name is chosen from the fact that the fruit from which the seed is taken came from the Garden of Eden, or at least that portion of the old world in which it is generally acknowledged the Garden of Eden was located.

A broadside has been received giving announcement of the Seventh International Dry Farming Congress—the "World's Greatest Agricultural Convention"—to be held at Lethbridge, Alberta, Canada, October 21-26, 1912. All farmers are invited to attend and participate in the event. This congress of farmers will consist of nine sectional conventions, as follows: Conference on Soils, Tillage Methods and Machinery; Conference on Crops and Crop Breeding; Conference on Agricultural Forestry; Conference on Live Stock and Dairying; Conference on Agricultural Education; Conference on Farm Management; Conference on Scientific Research; Conference of Agricultural Colleges and Experiment Stations, and International Congress of Farm Women (Rural Home Section of the International Dry Farming Congress). The Congress will be formally opened on Monday, October 21, at 11 a. m., by His Royal Highness the Duke of Connaught, Governor General of Canada, for the government of Great Britain, and Honorable James Wilson, Secretary of Agriculture of the United States, as personal representative of President William Howard Taft. The international delegates will include distinguished agriculturists of many countries. The governors of some American states, government officials of the Dominion of Canada and all western provinces will be in attend-

ance. Delegates may be appointed by governors, mayors, and all agricultural bodies and commercial organizations, but every farmer is invited without the formality of credentials, and all discussions will be open to farmers. Address all communications to John T. Burns, Executive Secretary-Treasurer, Lethbridge, Alberta, Canada.

CONTAGIOUS ABORTION AND MILK.

Circular No. 198 of the Bureau of Animal Industry, United States Department of Agriculture, reports the discovery that the bacterium of contagious abortion of cattle, occurs in milk. The organism was found in 8 samples of market milk among 77 samples tested (over 11 per cent.), and in the milk distributed by 6 among 31 dairies (over 19 per cent.). The discovery was made as the result of investigations conducted by Dr. John R. Mohler, chief of the Pathological Division. When milk containing the organisms was injected into guinea pigs, it produced lesions resembling closely those of tuberculosis. The effect on human beings is not known, but the circular states that the phenomenon is ominously serious to public health, and that "the bacillus forms another link in the long chain of facts that point unmistakably to the proper pasteurization of all milk before it is used as food as a measure essentially necessary for the protection of the public health."

APPRECIATION FROM CALIFORNIA.

San Francisco, April 18, 1912.

Daniel Logan, Editor The Forester, P. O. Box 366, Honolulu, T. H.

Dear Sir:—Referring to your issue of March, Vol. IX, No. 3, I beg leave to express my hearty appreciation of the value of the paper by Ralph S. Hosmer on the proposed reclamation of the Island of Kahoolawe. It is such painstaking and meritorious work now being carried on by so many in the public service, that rolls up such a grand total of accomplishment for good throughout our entire country.

Your publication is received regularly by the Sierra Club, and I assure you is appreciated, as it is the exponent for the Hawaiian Islands in those achievements for which the Sierra Club, at least in certain directions, carries on its activities. You have our hearty best wishes for every good achievement in the field of endeavor, which you particularly stand for.

Very truly yours,

E. T. PARSONS,
Member Editorial Board of Sierra Club Bulletin.

*ANNUAL REPORTS OF DIVISIONS OF FORESTRY,
ENTOMOLOGY AND ANIMAL INDUSTRY.*

Honolulu, July 25, 1912.

To the Commissioners of the Board of Agriculture and Forestry,
Honolulu, T. H.

Dear Sirs:—I beg to transmit herewith, for publication in the Forester and Agriculturist, copies of the Annual Reports of the Superintendents of Forestry, Entomology and Animal Industry for the calendar year 1911.

Yours truly,

W. M. GIFFARD,

President and Executive Officer, Board of Agriculture and Forestry, T. H.

DIVISION OF FORESTRY.

Honolulu, April 10, 1912.

Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I have the honor to submit as follows a brief report covering the main lines of work carried on by the Division of Forestry during the calendar year 1911.

In conformity with established policy the efforts of the Division were directed chiefly (1) to measures looking to the maintenance in good condition of the native forests, particularly those set apart as forest reserves, and to the extension of the forest reserve system; (2) to the encouragement of tree planting on government land and also by private owners, both through advice as to where, what and how to plant and through supplying plant material free, or at cost price; (3) to the giving of assistance, in person, by letter and by publications to persons desiring information on forest matters; (4) to carrying forward, as far as limited funds permitted, the experimental planting of trees and shrubs new to Hawaii; and (5) to protecting local forests from fire through the maintenance of a forest fire organization.

For the nine months' period from April 1 to December 31, 1911, during which a monthly allotment of \$3,500 was made to the Board of Agriculture and Forestry for the Conservation Fund for routine work, the amounts expended by the Division of Forestry were for salaries and pay rolls \$7,408.65, for current expenses \$730.58, a total of \$8,139.23.

During the year there was turned in to the treasury of the Territory from the Division of Forestry, as government realizations, a total of \$612.75, made up as follows:

Sale of plants, Government Nursery.....	\$401.35
“ “ seeds, Government Nursery	13.40
“ “ wood, Tantalus forest	48.00
“ “ plants, Homestead, Kauai, Nursery.....	150.00
	<hr/>
	\$612.75

FOREST RESERVES.

During the year two new forest reserves were created, South Kona and Puna, respectively in the Districts of Kona and Kau and of Puna, on the Island of Hawaii. The South Kona Forest Reserve has a total area of 36,952 acres, of which 29,260 acres, 79 per cent., is government land. The Puna Forest Reserve was set apart June 29, 1911. The area is 19,850 acres, all government land.

In Hawaii the greater portion of the forest area set apart, is reserved because of the value of the forest as a protective cover, which under the conditions of climate and topography that obtain locally, is needed to safeguard the headwaters of the streams that are diverted for use in irrigation. In other words, most of the Hawaiian forests are of what has been termed the “water bearing” class. In both of the reserves created in 1911, on the contrary, the primary importance of the forest is on account of the timber value of the trees, present or prospective. Both are in districts where there are no running streams. In both the forest is of the “commercial forest” class.

In February, 1911, the boundaries of two of the older forest reserves, West Maui and Kau, were slightly modified and the areas a little increased. At the end of the year there were 25 forest reserves with a total area of 631,956 acres, of which 435,657 acres, 69 per cent., is government land.

In June, 1911, under the terms of a logging license issued prior to the creation of the reserve, the sum of \$2,955 was paid to the Board of Agriculture and Forestry for timber to be cut in the Puna Forest Reserve. Under the forest law this money can be used elsewhere in the Territory for forest work. Up to the end of the year it has not been drawn against.

Progress was made during the year on a number of other forest reserve projects, in the way of examination in the field or the completion of the technical descriptions of boundary. Condemnation proceedings instituted by the government for the acquisition of a portion of the lands of Kehena 2 on the Kohala Mountain, which it is proposed be included in the Kohala Mountain Forest Reserve, were still pending at the end of the year.

FOREST PLANTING.

The second main line of work carried on by the Division of Forestry is the encouragement of tree planting both on government land and by private owners. Under a special allotment of the Conservation Fund a contract was entered into in May, 1911, with Mr. A. W. Carter, Manager of the Parker Ranch, for the planting of an area of approximately 50 acres on the Kohala Mountain above Waimea village, Island of Hawaii, in accordance with a planting plan drawn up by the Division of Forestry. Planting was begun in the summer and was in progress at the end of the year. The object of this work is to reclothe with trees open areas on the watersheds of streams that are needed for economic use on the Waimea plains. The trees planted are mainly Eucalypts. The seedlings were raised at the Parker Ranch Nursery at Waimea.

Under another special grant from the Conservation Fund the contract for forest planting at Pupukea, Oahu, begun in 1910, was completed in the early part of 1911. The bulk of the planting was accepted in April; final payment was made in October. About 30 acres were planted.

Owing to limited funds only these two forest planting projects were carried on in 1911 directly by the government, but considerable other planting was done on government land at private expense, under requirements of government land leases, or through special agreements, or voluntarily by corporations or individuals holding the lands for a long enough time to enable them to be willing to undertake planting.

In December a planting plan was drawn up by the Division of Forestry for government lands in the Kula District, Maui, held by Cornwell Ranch under a government lease requiring tree planting. Earlier in the year inspections were made of tree planting in progress, under similarly worded government leases on the Parker Ranch and the Kukaiau Ranch on Hawaii. Visits of inspection were also made during the summer and autumn to the Islands of Lanai and Kahoolawe, to various forest lands on Oahu, and to the land of Muliwai, Hamakua, Hawaii, the high plateau between Waipio and Waimanu gulches.

In September a general program of forest planting was worked out at the request of the Alexander & Baldwin interests, for the lands lying along the irrigation ditches in the Koolau district on Maui. The object of this project is to replace the forest cover on the area where it has been opened up in recent years through one and another cause. Much of the area to be planted is government land. Planting under this plan began in the autumn of 1911 and is actively going on.

To study conditions in the native forest on the windward side of Maui and to confer with the local forest officials in regard thereof, arrangements were made in the early spring of 1911,

whereby Mr. H. M. Curran of the Philippine Bureau of Forestry, made a month's visit to Hawaii in April and May. A brief report containing the recommendations made by Mr. Curran was published in June, 1911, issue of the Hawaiian Forester and Agriculturist.

Forest planting under private auspices was more general throughout the Territory in 1911 than in any earlier year. Exact figures by plantations are not available, but the total number set out was probably close on a million trees. The figure for 1910 was 725,000. In this work the Division of Forestry had a considerable share for over 587,000 seedling trees were sold or given away from the Government Nursery during 1911, of which 339,000 were furnished to corporations doing extensive planting. Under an arrangement whereby plantations are supplied with tree seedlings in boxes, just ready for the first transplanting, a number of companies that had not before cared to be bothered with the details of getting nursery stock ready, in 1911 undertook tree planting.

Tree planting by sugar plantation companies is usually done, either to provide windbreaks for exposed cane fields, particularly along the sea shore on the windward side of the islands, or to establish groves from which fuel wood may in time be cut. The good results obtained in recent years will undoubtedly lead to a further extension of this work.

Following is a statement of the trees given out during 1911 from the Government Nursery at Honolulu, including the branch Nursery in Makiki Valley used in part as a propagating station, and from the sub-nurseries maintained by the Division of Forestry at Hilo, Hawaii, and at Homestead,, Kauai:

FROM THE GOVERNMENT NURSERY AND MAKIKI STATION.

Sold and given gratis, including Arbor Day, January 1 to December 31, 1911:

Regular Distribution.

	In seed boxes.	In boxes transplanted.	Pot grown.	Total.
Sold	159,350	12,282	9,349	180,981
Gratis	35,900	9,823	10,184	55,907
Arbor Day .....	.....	1,508	10,000	11,508
	<hr/> 195,250	<hr/> 23,613	<hr/> 29,533	<hr/> 248,396

Special Plantation Orders.

Jan. to June, 1911 ..	114,000	.....	.....	114,000
June to Dec., 1911 ..	214,000	11,000	.....	225,000
	<hr/> 328,000	<hr/> 11,000	<hr/>	<hr/>
Totals	523,250	34,613	29,533	587,396

FROM THE SUB-NURSERY AT HILO.

For the calendar year 1911, Brother Matthias Newell reports that 12,104 seedling trees were given out from the Hilo Nursery. The species in demand were several Eucalypts, Ironwood, Silk Oak, Monterey Cypress, Japanese Cedar and various ornamentals. Considerable attention was paid to growing trees for school grounds and many seedlings were given out to school children to plant at home.

FROM THE SUB-NURSERY AT HOMESTEAD, KAUAI.

Mr. Walter L. McBryde, Special Agent in charge of the Homestead Nursery, says:

"Our records show that during the year 1911 we sold and gave away free to homesteaders some 11,239 trees. Had we had a larger number of trees on hand we no doubt would have been able to increase this amount, by at least double."

In addition to the distribution there were planted out in the Papahoolahola Experimental Reserve something over 4,000 trees. These, with the other trees planted in former years, are making good growth.

ADVICE AND ASSISTANCE.

Continuing the custom of former years much of the time of the Forest Nurseryman in 1911 was taken up in giving advice, verbally and by letter, to persons desiring information about the planting and care of trees. That this is a useful branch of the work of the Division of Forestry is attested by the many applications that are constantly being received. When necessary a visit is made to the premises where the work is to be done so that local conditions can be studied on the ground.

On the side of education in forestry various speeches and addresses were made during the year by the Superintendent of Forestry, more particularly in connection with Arbor Day and before the Hawaiian Sugar Planters' Association at its annual session in December.

In addition to the regular routine reports and those having to do with forest reserve and other special projects, the Superintendent of Forestry prepared during the year a number of articles on forest subjects for the newspapers or for the Hawaiian Forester and Agriculturist. Not a little of his time was given during the first three months of the year to seeing through the press the Report of the Board of Agriculture and Forestry for the biennial period ending December 31, 1910.

In May there was issued as Bulletin No. 1 of the Division of Forestry an illustrated bulletin entitled "Eucalytus Culture in Hawaii," by Mr. Louis Margolin of the U. S. Forest Service.

This bulletin is the result of the investigation carried on in 1910 with the coöperation of the Forest Service, when all the planted groves of Eucalypts in Hawaii were visited and all the information locally available in regard to Eucalypts got together. An edition of 3,000 copies was printed. The bulletin was given a wide distribution throughout the Territory.

SPECIAL INVESTIGATIONS.

Part of the duty of the Division of Forestry is to introduce into Hawaii exotic trees and shrubs of economic importance, that will grow here and be of service to the people of the Territory. This work of plant introduction is carried on principally at the Government Nursery at Honolulu and the Experimental Garden in Makiki Valley. During 1911 many plants new to Hawaii were started and made ready for distribution. The only way definitely to find out how exotic trees will succeed here is to try them. This is a line of work to which more attention should be paid.

In this connection it is appropriate to note that for several years now the Federal Forest Service has made annually an allotment for experimental forest planting in Hawaii. In the beginning all the money was used for the trial of temperate zone trees in fenced enclosures on the upper slopes of Mauna Kea and Mt. Haleakala. In 1911 an experimental plantation of Eucalypts was established in Nuuanu Valley. Sample plots of eighteen different species were planted—kinds little known in Hawaii, but reputed to be of economic importance. It is expected that an additional block can be started in 1912.

Until September, 1911, Mr. Joseph Rock was a regular member of the staff of the Division of Forestry, when he was transferred to the faculty of the College of Hawaii. Mr. Rock continues, however, as an honorary officer of the Board with the title of "Consulting Botanist."

In the spring Mr. Rock made collecting trips to Hawaii and Maui and in the summer again visited the Kau District on Hawaii. On each of these expeditions he collected much new herbarium material which was added to the collection. Pending the completion of the new building of the College of Hawaii, Mr. Rock continues to occupy quarters at the Board office on King street.

In September, 1911, there was issued as Botanical Bulletin No. 1 of the Division of Forestry, an illustrated 15 page pamphlet entitled "New and Noteworthy Hawaiian Plants."

In December another similar bulletin was issued by the College of Hawaii describing some additional new species, under the title "Notes upon Hawaiian Plants with Descriptions of New Species and Varieties."

By means of a fund raised through private subscription Mr. Rock expects in the near future to publish an illustrated book on

the native trees of Hawaii based upon data collected by him during his connection with this Board.

FOREST FIRE RECORD.

With the exception of a few small forest and grass fires on Oahu and a couple on Kauai all of which were, however, extinguished before serious damage had resulted, the forest fire record for 1911 is fortunately small. One of the fires on Oahu occurred in Manoa Valley in April, the other above Waialua in July. The fires on Kauai were in the woods back of Kilauea. Both occurred in June.

As in earlier years one ranger was employed throughout the year to patrol the Tantalus forest and to oversee the burning of brush, under permit, on Tantalus Heights.

Several changes in the staff of the volunteer fire wardens were made during the year, by which the efficiency of the service as a skeleton organization is maintained.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

Honolulu, December 31, 1911.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—I have the honor to submit herewith the eighth report of the Division of Entomology, covering the work performed by my department during the calendar year 1911.

By far the greater portion of the work performed by the division during 1911 consisted in the quarantine inspection of agricultural and horticultural products, arriving from various countries by steamers and sailing vessels. In addition to this work we undertook the Inter-Island Inspection on July 1, 1911, adding two inspectors to our department whose main duty is the inspection of all shipments of fruits and plants in the freight and baggage of the Inter-Island traffic.

The working staff of the division remained about the same as in 1910 except that Mr. H. O. Marsh resigned his place in February on account of ill health and although we had hoped to obtain another assistant, we were unable to do so on account of the shortage of available funds. On November 15 we were able to obtain the services of Miss Louise Gulick as laboratory assistant

for half-day service to relieve the work in the laboratory caused by the breeding out of fruitfly material.

During 1911 we inspected 380 vessels, of which we found 216 carrying vegetable matter, amounting to 11,157 lot shipments, which consisted of the enormous total of 187,997 packages. Of this amount 178,559 were packages of fruits and vegetables, 2,517 were seeds and 921 were plants. Of these shipments we destroyed by burning 367 shipments, amounting to 1,000 packages, 26 packages were returned and 1,464 packages were fumigated before delivery.

The great increase of fruit and vegetable shipments from the coast and the increase in the steamer service and other freight shipments from foreign countries makes the work very arduous and at times, owing to the shortage of inspectors, very trying. Were it not for the excellent equipment we have on the Oceanic, Hackfeld (now Matson Steam Navigation Co.), and Alakea docks, which latter is our waterfront office for Inter-Island inspection, we would not be able to cope with the important work. Further assistance and larger funds will be absolutely necessary as soon as the Panama Canal traffic starts, for without question, there will be a very material increase in imports of all classes. We have been unable to carry on much work in the distribution of beneficial insects, despite the fact that many requests have been made for such work. All this is on account of the inability of the Board of Agriculture and Forestry to supply the necessary assistant in the laboratory owing to the lack of funds. For the same reason we have only been able to spare moments to attend to the upkeep of the valuable insect collection and have not had time to make many additions to it. The Superintendent has donated a series of named beetles of North America, which adds considerably to the office collection.

INTER-ISLAND INSPECTION.

In November, 1910, shortly after the discovery of the Mediterranean fruitfly on Oahu, the Board of Agriculture and Forestry passed Rule VII, which was duly signed by the Governor. This rule was passed for the purpose of preventing the spread of this pest from Oahu to the other islands and although we were able, through the coöperation of the Inter-Island Steam Navigation Company to prevent freight shipments of fruits and vegetables leaving Oahu to the other islands, we were unable, on account of the lack of funds and inspectors, to examine baggage and packages belonging to individual passengers leaving on the local steamers as our regular quarantine work required all our attention. It was not until July 1, 1911, over six months later, that adequate funds, \$6,000 for a period of fifteen months, were available, that actual work was installed. Two inspectors were employed and the search of all questionable baggage and parcels

taken on Inter-Island boats was then started. Although we all realized that this outgoing inspection would in a measure help prevent many infested shipments from leaving Honolulu, yet we fully realized that the system was not as efficient as the regular inspection of incoming shipments usually practiced in the foreign Quarantine Inspection of the Board of Agriculture and Forestry and other Boards of Agriculture on the mainland. However, under existing conditions and the difficulty of finding qualified men at the ports of the other islands and considering the enormous expense entailed with only a small amount available, the only possible system to adopt was that now in vogue. It was soon found that Rule VII was not broad enough to cover the requirements of the inspection and the Board of Agriculture and Forestry replaced Rule VII by Rule IX, which made the law more stringent. Rule IX was duly signed by the Governor on June 28, 1911. We soon found that many complaints were being sent in regarding shipment of taro and root crops, much in demand for food, with the request that provision be made allowing such shipment to go if used for poi making and food. Again, the matter was gone over and finally the Board passed Rule XI which took the place of Rule IX, by adding a proviso for taro, lily roots and other tubers used in the manufacture of poi and other foods. Rule XI was duly signed by the Governor on December 18, 1911.

Owing to the stand taken by the State of California in regard to fruit shipments from Hawaii since the outbreak of the Mediterranean fruitfly the larger shippers of pineapples and bananas, the only fruit still permitted to enter California, have had to compete with a lot of poorly graded and badly infested fruit in competition with their clean shipments. In looking over the field and possible means of overcoming such conditions, the Superintendent recommended the passing of Rule XII, which gives the Board the power to enter into and inspect any premise, property or field with trees, plants or crops and on finding conditions thereon to the detriment of the fruit industry, to recommend remedies therefor or to abate the nuisances.

The passage of this rule, which was signed by the Governor on December 30, 1911, will no doubt do much towards a better practice of clean cultural methods.

There is a marked improvement in some of the banana plantations through the cleaning up of old worthless plants which were badly infested with scale insects and the gathering and burning of all old leaves and rubbish, but only a few have been induced to carry out this method. The same can be said of the cotton fields where all infested bolls are gathered and burned. By the passing of Rule XII much of this work can be enforced with good results.

The banana industry of the Territory is a profitable one and generally speaking, banana culture is not hampered with any disease or pest when up to date cultural methods are used. Owing

to an outbreak of a serious disease of the banana in Central America, the West Indies and adjacent countries and in view of the fact that there was a possibility of bringing into the Territory banana plants from these sections, the Board of Agriculture and Forestry passed Rule VIII prohibiting the introduction of any banana fruit, banana sprouts or plants from Central America, including the Panama Canal Zone, the West Indies, Dutch Guiana or any other locality where the said disease exists or may become known to exist. An act passed by the last legislature to regulate the importation and sale of seed into and within the Territory did not provide funds for the appointment of a Territorial Seed Inspector; as my department has in the past inspected all seeds to prevent the introduction of seed pests, the duty now has fallen on my division to examine and sample seed shipments coming into the Territory. During the year we have kept samples of various forage seeds which were imported for planting. In every instance the seed was found very free from adulterations. Not being equipped for a thorough seed test by sprouting, no experiments were conducted on these lines.

Appended hereto are some tabulations showing the total arrival of vessels, their contents of vegetable matter and the disposition of the various shipments. Also a list of the pests intercepted in the inspection work.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

Injurious insects and diseases intercepted which were found on shipments of fruits, vegetables and plants imported into the Territory during 1911:

ORTHOPTERA—Eggs of *Holocloro* species in peach twigs, Japan; *Phyllodromia germanica*, *Periplaneta americana*, *Pausaniasia*—in various shipments of merchandise and vegetables from the Orient.

THYSANOPTERA—*Heliothrips haemorrhoidalis* on camelia, Sydney.

HEMIPTERA (*Heteroptera*)—*Capsus* species on pine tree, Japan; *Capsus* species on orchids, Manila; *Tingid* species on orchids, Manila; *Aradid* species on orchids, Manila.

HEMIPTERA (*Homoptera*)—*Chermes* species on pine tree, Japan; *Lachnus* species on pine tree, Japan; *Macrosiphum sanborni* on chrysanthemum, Ohio, U. S. A.; *Aleyrodes citri* on orange leaves, Japan; *Aspidiotus cyanophylli* on palm, Florida; *Aspidiotus cydoniae* on cocoanut, Central America; *Aspidiotus perniciosus* on peach tree, Japan; *Aspidiotus nederæ* on lemons, Sydney; *Chrysomphalus biformis* on cocoanut, Central America; *Ceroplastes rusci* on loquat, Japan; *Coccus hesperidum* on *Rhodea japonica*, Japan; *Chionaspis permutans* on lemons, Syd-

ney; *Diaspis baisduvali* on orchids, Manila; *Hemichionaspis aspidistrae* on *rhodea japonica*, Japan; *Lepidosaphes beckii* on nursery stock, Japan; *Lepidosaphes euryae* on camelia, Japan; *Lepidosaphes uniloba* on *rhodea japonica*, Japan; *Leucaspiis japonica* on maple tree, Japan; *Pinnaspis* species on oranges, Fiji; *Pulvinaria psidii* on maple tree, Japan; *Pseudococcus pinii* on juniper tree, Japan; *Pseudococcus azelae* on maple tree, Japan; *Pseudococcus* species on pineapple, Manila; *Parlatonia pergandii* on maple tree, Japan.

LEPIDOTERA—*Angumsis* grain moth on corn, Louisiana, U. S. A.; *Cnidocampus flavescens* on fruit trees, Japan; *Clisiocampa* species (tent caterpillar) on fruit trees, Japan; Bag worm (three species), on tea plant, loquat, pine tree, Japan; *Lycanid* butterfly on orchids, Manila; *Poralipea modesta* on rice, Japan; *Parasa* species on maple tree, Japan; *Plodia interpunctella* on beans, Japan; *Porthetria dispar* (Gypsy moth) on plants, Japan; *Pyralis farinalis* on rice, Japan; *Tineid* leaf miner on citrus plants, Japan; *Tortrix* miner on ornamental plants, Japan; *Thysiodopteryx* species on camelia plants, Japan; *Thysiodopterix* species on *thuya orientalis*, Japan.

DIPTERA—*Phorbia brarsicae* on turnips, U. S. A.; *Syrphid* species on orchids, Manila; *Tipulid* on soil, Japan; *Phorid* on soil, Japan.

COLEOPTERA—*Actheopeus aterrimus* on orchids, Manila; *Adoretus* species in soil, Japan; *Balandinus rectus* in chestnuts, Eastern U. S.; *Balandinus probosideus* in chestnuts, Eastern U. S.; *Bruchus prosopis* in mesquite pods, Mexico; *Calandra grancria* in corn, U. S. A.; *Calandra oryzae* in rice, Japan; *Calandra linearis* in rice, Japan; *Calandra* species in quercus seed, Formosa; *Carabid* on orchids, Manila; *Cryptorhynchus* species on brownia seeds, Java; *Cylosformicarius* on sweet potatoes, Hongkong; *Elaterid* larvae on orchids, Manila; *Melolontha* species in soil, Japan; *Scolytid* on Brownia seeds, Java; *Scarabaeid* in soil, Japan; *Staphylinid* in soil, Japan; *Tenebrioides mauritonicus* on rice, Japan; *Tribolium ferrugineum* in rice, Japan.

HYMENOPTERA—*Formica nigra* on artichoke flowers, San Francisco; *Lasius interjectus* in soil on roots of plants, Japan; *Polyhachis dives* on plants, Japan; *Strumigenys lervisi* on tea plant, Japan; *Lasius niger* in soil, Japan; *Cremostogaster sordidula* on pineapple, Manila; *Dolichoderus bituberculatus* on orchids, Manila.

MISCELLANEOUS—*Cladosporium citri* on citrus plants, Japan; Brown velvet lichen on maple and cherry trees, Japan.

RECAPITULATION OF INSPECTION WORK.

Vessels inspected, Honolulu.....	380	
Vessels found carrying vegetable matter, Honolulu..		216
Vessels inspected, Hilo.....	87	
Vessels found carrying vegetable matter, Hilo.....		40
	<u>467</u>	<u>256</u>
<i>Disposal of Shipments—Honolulu.</i>		
Passed as free from pests.....	<i>Lots.</i> 10,640	<i>Packages.</i> 179,507
Burned	367	1,000
Returned	5	26
Fumigated	145	1,464
	<u>11,157</u>	<u>181,997</u>
<i>Disposal of Shipments—Hilo.</i>		
Passed as free from pests.....	<i>Lots.</i>	<i>Packages.</i> 21,795
Burned . . . . .	. . . .	45
Returned . . . . .	. . . .	12
Fumigated	1,478	210
	<u>12,635</u>	<u>204,059</u>
Grand Total	<u>12,635</u>	<u>204,059</u>
Fruits and vegetables inspected.....	200,487	
Plants inspected	955	
Seeds inspected	2,617	204,059
	<u>200,487</u>	<u>204,059</u>

RICE SHIPMENTS.

Passed as free from pests.....	252,357 bags	
Fumigated on account of weevil.....	8,467 "	260,824
	<u>252,357</u>	<u>260,824</u>
Corn fumigated	552 bags	
Beans fumigated	900 "	1,452
	<u>552</u>	<u>1,452</u>

INTER-ISLAND INSPECTION.

For six months—July 1 to December 31, 1911.

Steamers attended	314
Packages of fruits, vegetables and plants passed.....	3,132
Packages of fruits, vegetables and plants refused shipment.	590
	<u>3,722</u>
Total packages inspected	3,722

DIVISION OF ANIMAL INDUSTRY.

Preliminary Report of the Territorial Veterinarian for the Calendar Year 1910-1911.

Honolulu, May 31, 1912.

Hon. W. M. Giffard, President and Executive Officer and the
Board of Commissioners of Agriculture and Forestry,
Territory of Hawaii.

Gentlemen :

LIVE STOCK CONDITIONS IN GENERAL.

The past year has proved an exceedingly gratifying one in so far as live stock sanitary matters are concerned. With the exception of a couple of the smaller islands (Lanai and Niihau) conditions have been everything that could be desired for the furtherance and profitable development of the live stock industry. While the heavy influx of military men has necessitated the importation from the mainland of large quantities of meat, there can be no doubt that, under normal circumstances, the Territory would have been more than able to supply the local demand for all classes of meats, except possibly poultry, and there is every prospect that the modern methods adopted by the leading ranches, of utilizing only the highest class of pure bred breeding animals, will double the output of either beef, mutton or pork and enable the local interests to supply the demands of even this inflated meat-consuming population, at prices which of necessity must be profitable, owing to the distance from the nearest available market, and to the fact that grass fed and finished beef and mutton of unexcelled quality, can be produced here without resort to the use of concentrated feeds (grain, corn). Climatic conditions have been favorable and, as stated, the ranches which, a few years ago, foresaw the coming demand and prepared for it by the importation of high class breeding animals are now harvesting the reward of their enterprise. The value of a finished carcass of beef has practically doubled, considering the earlier maturity, the increased percentage of valuable cuts as compared to waste and the rise in price resulting from demand. When to this is added the reduction in cost of production and marketing which is bound to result from coöperation, as well as from competition, there can be no doubt that Hawaii will hold its own as a meat market for the local demand.

Pork, of which large quantities are consumed, especially by the oriental population, is now being supplied entirely from local sources. A few years ago there were imported annually from 6,000 to 8,000 live butcher hogs, while at the present time and for more than two years past not a single hog, and comparatively little refrigerated pork, has been brought here from the outside.

Poultry, eggs and dairy products, however, remain far behind where the question is of local supply. Practically all milk is consumed as such, and what little butter is produced rarely reaches the market. No more ideal climatic conditions could be found for poultry raising, and the demand for eggs and chickens is enormous and still there does not, to my knowledge, exist a single poultry farm worth the name in the islands. Diseases of poultry are few and easily controlled and the vexing question of housing is a negligible one here. Nevertheless, I have seen experienced poultry raisers with money to invest return to the mainland after spending weeks in vain searching for a suitable location for a chicken ranch, either as homesteaders, lessees or purchasers.

DISEASES OF LIVE STOCK.

The past year has been practically devoid of any serious outbreak of either infectious or contagious diseases among live stock, while parasitic diseases have continued to decrease with improved methods in handling and caring for the animals. Glanders among horse stock seems practically to have disappeared since the continued introduction of the infection with imported animals has been stopped by means of inspection, testing and quarantine. Here again, the climatic conditions undoubtedly have been of great value as there can be no doubt that many cases recover, temporarily at least, and some perhaps permanently. The total absence of closed or ill ventilated stables is the most important factor in the natural decrease of this scourge. Next to this the constant vigilance of the deputy territorial veterinarians who sooner or later are sure to locate even cases which are deliberately being hidden, in connection with the increased knowledge of the dangerous nature of the disease, have done much to cause either the destruction or at least the isolation, whether clandestine or not, of suspicious cases. To this must be added the effect of the law enacted by the last legislature making it a misdemeanor to sell or dispose of an animal affected with or suspected of having glanders and making the vendor responsible for any damages or loss resulting from such a transaction. The immense advance in the prices of horses and mules has likewise had a tendency toward the prolongation of life of all work animals through increased efforts on the part of owners and employees in protecting them from exposure to infection, and not the least direct result thereof is the elimination of the public watering trough or the indiscriminate watering of horse stock at places where the nature of the supply is in the least doubtful. The dissemination of knowledge along these lines through the published reports of the Board has, possibly more than anything else, been responsible for this most remarkable decrease in a disease which in less favorably located countries, still remains at the head of the list of destructive diseases. But obviating further discussion as to which of

these contributing factors is the most important, the fact remains that glanders has practically disappeared or else is effectively hiding itself, and it is safe to conclude that so long as the source of supply of fresh infection remains at zero, so long as no fresh cases of glanders are allowed to enter the Territory from without—and we continue to pay the price, eternal vigilance—so long will we remain free from the disease. On the other hand, let us relax and listen to the arguments of those whose source of income is at all depending upon the number of animals they sell, commensurate to a great extent with the number of animals which die, and whose chief argument is, that no case of glanders has arrived here from without for the past four years, and that consequently the regulations pertaining to importation are obsolete and no longer required,—and I feel confident that it would be but a very short time before we would have the disease with us again. The pass has been reached where the purchaser of live stock on the mainland has only to mention the fact that he comes from Hawaii when the dishonest dealer disappears. Let us rescind our regulations in the least, and the old conditions, when Hawaii—being 2,000 miles away—was considered the safest dumping ground for reacting horses and cattle, would speedily come to life again.

What has been said above in regard to glanders among horse stock applies with almost equal force to tuberculosis of cattle. The climatic conditions, allowing of open stables the year around, are entirely in favor of the eradication of the disease. Many cases undoubtedly make a temporary or apparent recovery, and only a small percentage ever reach the fatal termination, except when accompanied by advanced age. The regulations of the Board pertaining to the inspection and testing of cattle intended for importation, have effectively put an end to the further introduction of the disease from without. The eradication of the disease from the local herds has constituted the main work of this division for the past three years. A splendid spirit of coöperation, coupled with unexcelled willingness to sacrifice the affected animals, have characterized the campaign against the disease, making it possible to practically eradicate it from the City and County of Honolulu, without using either coercive measure or compensating the owners of diseased animals, even partly, for their losses. The same educational measures, the regular publication of monthly reports on the work of the division, has created a tendency on the part of milk consumers to demand clean milk, this is, milk originating on premises where no diseased (reacting) animals are kept, and where the milk is drawn and handled under sanitary conditions. In this work this division has had the full assistance of the local Board of Supervisors as well as the coöperation of the Honolulu Dairyman's Association. The former, through the office of the county physician, delegated its milk inspector to assist the testing of more than 5,000 dairy animals,

while the latter installed the most modern electric milk purifying devices, and what is most important, refused to receive milk except from clean herds and sanitary premises. At the same time the local Board of Health, through its Pure Food Commissioner, cooperated by enforcing the requirements of the statutes pertaining to the official milk standards, with the result that the City of Honolulu may be said to have a milk supply second to none and equal to the best of any city of its size in the United States.

The adoption of the intradermal method of tuberculin testing has, so to speak, revolutionized the campaign of eradication of bovine tuberculosis, compelling, as it does, the confidence of the owners, and at the same time obviating the many inconveniences and objectionable features of the old subcutaneous method. The fact that an owner can see for himself whether an animal reacts or not, that he no longer has to blindly accept the word of the inspector—frequently in doubt himself as to whether the temperature record spells positive or negative—has by one stroke done away with ninety per cent. of the old objections to having the animal tested, and when a majority of the consumers demand of the producer to know whether the cows have been treated and whether any of the reactors are left on the premises before leaving an order for milk to be delivered at his home, then the moral effect becomes binding, and the result comes very close to one hundred per cent. of "clean" dairies, as is now the case in Honolulu. It is the aim of this division to extend the work of eradication of bovine tuberculosis to the entire group, and if the same spirit is found to prevail on the other Islands as on Oahu, the end is in view. With the assistance of the Deputy Territorial Veterinarians on the other islands, who must be remunerated for the time given to the work, and with the necessary funds for traveling expenses for an inspector and an assistant sent out from this office, with an automobile, it is anticipated that a sufficient number of milk producers will be found willing to have their herds cleaned up, to compel the balance to either follow suit or go out of the business.

The only disease which has at all caused any alarm during the past year is *cerebro spinal meningitis* among horses and mules. Outbreaks of this have occurred on all four of the principal islands, but especially on Maui. In accordance with the latest views on the subject the disease must be classified as a *toxæmia*, due to the assimilation of musty or mouldy feed, rather than as an infectious disease. The condition cannot be transmitted from animal to animal, even by direct inoculation, and can always be controlled when it is possible to locate the existing cause, which is generally found to be musty grain or possibly water found to be contaminated by decomposing vegetable matter. A rather severe outbreak of this disease was investigated during the past year, and an attempt to stop it was made by applying Pasteur filters to the water pipes supplying the stables where the affected ani-

mals had contracted the disease. Owing to a considerable amount of sediment in the water the filters soon became clogged, and the experiment had to be abandoned. The principle, however, is no doubt correct and if the mechanical difficulties could be surmounted the disease could most likely be controlled or prevented by means of the filters. These would at the same time remove the eggs and embryos of intestinal parasites which, I am inclined to believe, always play a certain part where nervous symptoms appear endemically among horse stock.

Rabies in Dogs. During the latter part of the last calendar year the attention of the Board was called to the fact that rabies among dogs was quite prevalent in certain parts of California, and so long as this Territory was practically unprotected against an invasion of the disease, instructions were issued from this division to prepare a regulation for the purpose of preventing it from gaining entrance here. A thorough investigation of the subject proved that preventive measures were urgently needed, and while the resulting regulation did not go into effect until March 1st of the present year, it was considered well to mention the matter in this report so long as subsequent developments have caused the establishment of a four months' quarantine against dogs, and made the enforcement of the same one of the most important branches of work of this division.

By inquiry through official channels it has been learned that the present outbreak of rabies in California alone has already demanded a toll of not less than nine human lives from hydrophobia, while hundreds (officially reported cases) of dogs and other domestic animals have succumbed to rabies or have been destroyed after being exposed to the disease through bites inflicted by infected animals. The seriousness of the situation is best realized by stating that it has become necessary to establish not less than eight official stations for administering the Pasteur treatment to persons bitten by rabid dogs, in California alone, and that similar measures have been, or are being taken by neighboring states.

This Territory has, as stated, protected itself by the enforcement of a rigid quarantine against all dogs coming from or through countries where the disease is known to exist, and by a campaign of eradication of ownerless dogs within the Territory. As there can be little doubt that the entrance of the disease into this Territory, in its present unprepared state, would prove nothing short of a calamity, it is to be hoped that the measures now in force will prove effective, until such time as the respective authorities shall be able to cope with it and be prepared to protect human life as well as that of dogs and other domestic animals as is now being done by this Board. To postpone the preparation for administering the Pasteur treatment, until the disease is actually here, would seem somewhat risky in view of the distance we are removed from the nearest place where it can now be obtained, and it is therefore urgently recommended that steps be taken

without delay for the establishment of a Pasteur laboratory in Honolulu.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

FRUIT FLY CAMPAIGN.

Honolulu, August 1, 1912.

To the Commissioners of the Board of Agriculture and Forestry.

Gentlemen:—I am pleased to report that during the past two months (June and July) there has been a gradual but marked improvement in the condition of infestation throughout the area of Honolulu covered by existing regulations. The same may be said, in a measure, of portions of outside but adjacent territory. In the latter instance the apparently improved condition may to some extent be due to the few wild guava at present in fruit, although the mountain apples in the valleys, which are now in season, show very little, if any, infestation at all. The improvement in Honolulu gardens is undoubtedly due in part to a better and more general coöperation on the part of householders, who are now taking more interest in the work of the campaign and particularly in the proper disposition of their fallen fruit. Very much better results would be obtained if the whole community combined in an every day "clean up" and the City and County government could be prevailed upon to adopt the daily free garbage throughout the city and suburbs, which I have strenuously advocated since the beginning of the campaign. Credit, however, should be given the County Supervisors for having co-operated in our campaign work to the extent that the incinerator was again placed in commission at the service of the public after having been closed down during a long period. Had it not been for the effective destruction of the large quantities of fruits taken to the incinerator by the Garbage Department and the additional service of special outside transportation arranged for by the Board of Agriculture, the outcome of the campaign at this time would have been obviously different. As it is, there is, as already stated, room for much improvement in the garbage transportation system, which, however, can hardly be remedied until this is made free to all.

Since my last report a special corps of inspectors under the immediate supervision of Mr. Weinland have continued spraying with "Mally's" arsenate of lead solution areas of fruit trees in local gardens. During the past two months the spray gang has covered the districts four times, which is as much as the limited

appropriation has thus far permitted. For reasons explained in previous reports, it was found impracticable to undertake systematic spraying with poisoned bait solution in conjunction with that of "clean culture" until the Territory was reasonably assured of financial assistance from Congress. This combination method of combating the pest, other than on experimental lines, was therefore not possible until last May, at which time assurances were received that the Congressional appropriation asked for would probably be granted. Unfortunately circumstances of a political nature at Washington, D. C., have temporarily stalled several of the large appropriation bills now before Congress, in one of which our item is included. It is expected, however, that these bills will have favorable attention before adjournment of Congress during August. In the meantime the departure from Washington of the representative (Dr. Back) of the U. S. Bureau of Entomology has been indefinitely postponed. Advice received by me from the Chief of the Bureau state that Dr. Black will leave just as soon as Congress finally passes the appropriation bills referred to.

Many complaints have been made regarding the peculiar condition affecting a very large percentage of mango fruits this season. In the earlier part of the season it was supposed that this condition, which is one of decay whilst on the tree, was due to attack of the Mediterranean fruit fly. It soon became apparent that this latter part had nothing whatever to do with the matter nor was this particular form of rottenness caused by a fungus disease, as originally suspected. Special breeding experiments with this class of rotted fruit were undertaken in the laboratory, the result being that no fruit fly was bred from same, but in every such case it has been found that the seed was attacked by the mango weevil, which, it appears, is exceedingly prevalent throughout Honolulu this season. The attack of the weevil in the fruit undoubtedly brings about fermentation and the subsequent rottenness complained of. These facts have been corroborated by the U. S. Experimental Station, to the Director of which my thanks are due for courtesies rendered.

The insular conditions of infestation remain the same, Hilo, Puna and Kau on the Island of Hawaii being the only districts in which the fruit fly has not yet been observed. From personal observations, as well as from information received, I am led to believe that the inspection conducted by our island neighbors on the arrival of steamers from infested ports has not been as efficient as it should have been if it was intended to keep the pest out. There are, however, reasonable excuses to offer for such a state of affairs, the principal ones being the lack of funds to pay a sufficient force of efficient inspectors at the many terminal and way ports touched by our inter-island steamers and the absence of necessary legislation making it legally possible to search the passenger and his baggage when embarking on or disembarking from

inter-island steamers without a search warrant. It has been previously mentioned that all such inspection must, as a result, be perfunctory. Many of the districts have contributed financially and otherwise with a view to employing inspectors, for their special sections of territory, but not to a sufficient extent to ensure the appointment of special men for the important work required. Even at this moment the district of Hilo has practically thrown up its hands and the inspection work at its main port is not now being carried out as efficiently as it should be because of the alleged impossibility of controlling the thoroughfares leading into that district from Hamakua, where the pest has already been admitted by means of either the Kohala belt road or through one of the Hamakua ports. It is, therefore, quite natural to suppose that in a very short time the fruit fly will be found throughout Hilo and it will then only be a matter of a few months before it passes through Puna into the Kau district. The last named section is well guarded on the Hilo side by a locked gate on the belt road at Kapapala, but the Kona side, I am informed, is not so well cared for and as Kona is infested throughout, it will be an easy matter unless the greatest care is taken, for the pest to pass into Kau by means of infested fruit on the person or in the baggage of any passengers entering the latter section by that end of the belt road. The same arguments apply to the landings of Punaluu and Honuapo, in Kau, which are the calling ports of steamers bringing freight and passengers from other infested islands or districts. In my opinion the only successful inter-island inspection and method of control on the adjacent islands would have been such as Federal officers would have been most likely to pursue under U. S. laws. It is well admitted that officers of the Federal government, backed by a sufficiently large appropriation, can better handle the traveling public and the inspection of their baggage, as well as that of general freight, at ports of disembarkation in this insular territory than can the territorial or county officials. The Federal officer will take but little notice of inconvenience or delays occurring because of any necessary inspection he has to perform in his line of duty and furthermore he is not so subject to influence and unjust criticism as our insular officials.

The latest information from Dr. Silvestri is that he is now well on his way to the section of Africa where he hopes to meet with a measure of success in his search for an effective parasite on the Mediterranean fruit fly and Cotton Boll worm. Arrangements were made through Governor Frear and the State Department at Washington so that Dr. Silvestri might receive credentials from and the backing of the several European nations in control of sections of the African continent where the explorer is liable to meet with difficulties of one kind or another unless armed with the proper official authority.

For reasons previously explained, it has become necessary to

modify the existing regulations of quarantine on certain fruits and vegetables which it may be necessary to transport from one infested island or district to another.

The Board recognizing this fact submitted a request to the Governor to amend Regulations X, XIV and XV pertaining to the sanitary horticultural conditions in Honolulu, Hawaii and Maui. Final action has been temporarily delayed due to the fact that it is the desire of the administration to embody the above three regulations into one, which, under present conditions as to infestation, will now better answer the purpose of the Board.

Respectfully submitted,

W. M. GIFFARD,
Director, Fruit Fly Campaign, T. H.

DIVISION OF ANIMAL INDUSTRY.

REPORT FOR JUNE.

Hon. W. M. Giffard, President and Executive Officer,
Board of Agriculture and Forestry.

Sir:—I beg to report on the work of the Division of Animal Industry for the month of June, as follows:

Tuberculosis Control Work.—A comparatively small number of cattle have been tested during the month, the prolonged drouth having made it impossible to finish this important undertaking. There still remain about 2000 head of cattle, all range stock, to be tested and with the coming of the bean season, which promises an unusually heavy crop, it is expected that the remaining herds can be gathered and tested. In the meantime all reacting animals have been removed from the dairy herds and the milk supply of the city can safely be pronounced free from tuberculosis infection.

Importation, Inspection and Quarantine.—As will be seen from the detail report hereto appended, a large number of live stock, especially horses and mules, arrived from the mainland, one steamer alone bringing 136 head. Fortunately most of the horse stock came from the Central and Northwestern States and were shipped via Portland; otherwise it is doubtful whether the Quarantine Station would have been large enough to accommodate them all. A considerable number of brood mares, destined for Maui, were allowed to finish their quarantine period on that island under the supervision of the local representative of this office. With the exception of a few cases of influenza and shipping fever, all the animals arrived in good condition.

The congested state of the dog quarantine division was relieved

on the 19th of the month by the discharge of the 16 performing dogs mentioned in my last report and which it had become necessary to furnish quarters for while awaiting the departure of their steamer.

There are at the present time 17 dogs in quarantine, but a number of these, the first arrivals after the rabies regulation went into effect, will be released during the month of July.

The 16 dogs in quarantine at Schofield Barracks have been visited regularly, at least once a week, and do not seem to suffer any from their confinement. This is undoubtedly due to the elevation and the much lower temperature which they enjoy at Leilehua as compared to our station on the Beach Road.

The construction of six additional kennels with twelve houses was finished by the middle of the month and there now only remains the building of a concrete tank for the use of spaniels and other long-haired dogs which suffer much from the heat unless they have frequent access to a pool of water. Such a concrete tank with the required plumbing and with a corrugated iron roof over is estimated to cost \$116—(Oss) and will, I believe, add materially to the welfare of the animals during their prolonged detention, besides demonstrating to the owners that everything reasonable is being done for their pets. For these reasons I consider this tank a necessity and would respectfully ask the Board to allow the estimated sum for its construction. In case of favorable action there will still remain an unexpended balance of \$200 from the sum at first recommended as necessary for the completion of the Dog Quarantine Station.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT FOR JULY.

Honolulu, August 1, 1912.

Hon. W. M. Giffard, President, Board of Agriculture and Forestry.

Sir:—I beg to submit herewith a report on the work of the Division of Animal Industry for the month of July, 1912.

IMPORTATION, INSPECTION AND QUARANTINE.

An unusually large number of domestic animals of various classes and breeds have arrived during the past month. Of work animals, nearly one hundred head arrived, mostly mules, and all of superior quality. Of this number 75 are now in quarantine where they will remain until the 14th inst. At the Hilo Quarantine Station there are now 32 mules, which are to be released

on the 10th inst. This fact is mentioned because the Deputy Territorial Veterinarian from Hilo, Dr. Elliot, is in the Queen's Hospital here, having been operated on for appendicitis, and in case he does not recover in time it will be necessary to send an inspector from this office in order to pass on and release these animals.

Of breeding stock, there arrived four large jacks, which go to the Parker Ranch for mule breeding. This ranch has, during the past four years, endeavored to produce mares of sufficient size to raise large mules from, and there is every indication that before long a large percentage of the mules, which are now being imported here annually, will be raised in the Territory. By the exclusive use of large imported stallions, principally Percherons and German Coach, the above mentioned ranch has succeeded in developing both the size and the quality of its brood mares, several hundred of which will now be bred to the imported jacks, thereby adding an immensely important branch to the live stock industry of the Territory.

By reference to the annual reports of this division for the past six years, it will be seen that every effort has been made to get the stock breeders here to take up mule breeding and it is therefore highly gratifying to see that the end is finally in view. Both feed and climate are ideal for the purpose in many localities here, especially in the mountain pastures on Hawaii, Maui and Molokai, and it now only remains to be demonstrated if mules that are raised here will possess the same amount of stamina, that is, energy and endurance, as the imported mules, and there is every reason to believe that such will be the case.

Another importation of equal importance and undertaken by the same ranch was the arrival a few days ago of a number of the very finest Hereford heifers, which will form the nucleus of a breeding herd which, with the blue ribbon bulls which already have arrived, will rival any breeding herd in the United States. Too much credit cannot be given to the management of this large ranch, which supplies more than 90 per cent. of all the beef consumed in Honolulu, for the excellent quality of this most important food product which is now constantly available here, besides which these importations of the Parker Ranch have made it possible for less favorably situated cattle breeders to obtain high class breeding animals without having to send away for them. In this way the entire Territory is benefited and it is safe to predict that before long the erstwhile long-horned and long-legged range cattle will be a thing of the past in these islands.

In absolute contrast to the above stands the local poultry industry. During the past month not less than 137 crates of live poultry arrived at this port alone, many of the crates holding five or six dozen birds each and nearly all of egg-laying breeds. This is one of the problems which has been repeatedly discussed in these reports but instead of getting better it seems that the im-

portations are constantly increasing. Vast quantities of cold storage eggs and butchered poultry are constantly arriving, and while the demand has increased greatly with the military invasion, the local supply seems to be diminishing instead of responding to it. In no previous month, not even at Thanksgiving or Christmas time, do I remember seeing such quantities of live poultry arriving here, and still I know of no more ideal conditions for poultry raising than those which obtain here, barring the cost of feed. But that one objection is easily offset by the prices which poultry and eggs command here. There are no diseases worth mentioning and costly housing is uncalled for, and still such a thing as a "Chicken Ranch" is unknown here.

During the past month there arrived ten dogs, of which number eight were permanent arrivals, while two only belonged to temporary visitors—theatrical performers—and which have already departed. Twenty-two dogs are now in quarantine and the station is practically full. Where sex and other conditions permit of it, more than one dog is placed in each kennel, but this can, as stated, be done only with animals which arrive at the same time or approximately so.

In connection with the dog quarantine, I beg to say that a great deal of the keeper's time is taken up with these animals, and that with more than one hundred head of large animals in the station, as at the present time, I have to ask the Board's permission, in case it becomes absolutely necessary, to temporarily employ a man to help the keeper out, for a week or two perhaps. With so many animals there are constant repairs to be made to fences and gates, while feeding, watering and hauling of manure consume a great deal of time, owing to the not inconsiderable distances that feed and manure must be hauled by means of a wheelbarrow, in heavy sand.

The dogs quarantined at Schofield Barracks have been visited regularly once a week, and all appear to be doing well so far. One of these, belonging to Capt. Apple, will be released today, while the other 15 will remain in quarantine until September 11th.

An application from Mr. Munro, of Lanai, for the admission of three dogs from New Zealand, without quarantine, is submitted for the consideration of the Board, with the recommendation that the same be granted if, upon arrival, the required certificates of health are found satisfactory.

TUBERCULOSIS CONTROL WORK.

It will be seen from the appended report of my assistant, several hundred head of cattle have been tested during the past month and all reacting animals have been branded and removed from the herds where found.

GLANDERS.

This disease has unfortunately made its appearance again, and under most annoying circumstances. At the request of the sheriff, a horse which had been found wandering in the streets until placed in the Kalihi pound was examined and was found to be suffering from typical glanders. Though the sheriff detailed two officers to try to locate the owner, they did not succeed, and the horse was shot. As the animal was suffering from a profuse discharge from the nose, it is to be feared that other animals may have become infected, but so long as the owner, who undoubtedly was aware of the animal's condition, could not be found, no further measures could be taken to prevent the spread of the disease.

A hitherto *unknown disease* has made its appearance in several local stables, a total of four cases having come under observation, one of which has died. The disease resembles tetanus or lockjaw to a certain extent, and may possibly prove to be a toxæmia, due to intestinal parasites. Unfortunately no opportunity to make a post mortem examination has presented itself, the one fatal case not being reported in time for this purpose.

RABIES.

A total of 191 ownerless and stray dogs have been caught and destroyed in the gas chamber in the jail yard.

From reports received from the health authorities of California and Oregon, it appears that rabies is spreading steadily and the Board's action in enforcing a strict quarantine against all dogs coming from or through infected countries would therefore seem fully justified.

Very respectfully,

VICTOR A. NØRGAARD,
Territorial Veterinarian.

 REPORTS OF ASSISTANT VETERINARIAN.

Honolulu, June 30, 1912.

Dr. Victor A. Nørgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit herewith a report on the work accomplished during the past month.

TUBERCULOSIS CONTROL.

The work in this line has consisted of testing the new cattle taken into the different dairies. This amounted to a total of 55 head, scattered in eight different dairies, all of which passed the

test and were tagged in the usual manner. The large majority of these animals had been purchased in the district of Kona, Hawaii.

The following is a tabulated list of the dairies visited:

- June 3-5—
 Kamehameha Schools, 1 cow.
 T. Fernandez, 3 cows, 1 bull.
- June 21-24—
 M. Riedell, 1 cow.
 M. Kawamura, 3 cows.
- June 24-26—
 S. T. Allencastre, 1 cow.
 T. W. McGuire, 10 cows, 1 bull.
 T. Gouveira, 19 cows.
- June 25-27—
 M. Gomes, 14 cows, 1 bull.

EPIZOOTIC LYMPHANGITIS.

On June 14 my attention was called, by Dr. L. E. Case, to a mule in the Public Works stables which had a suspicious discharge from the nose.

In company with Dr. Case I made an examination of the animal, with the following description:

Mule; female; about 20 years old; was crippled to some extent by a fall on the knees. The animal had been losing flesh for some time and the knees were healing very slowly. There was a bi-lateral discharge from the nose and numerous ulcers upon the nasal septum; sub-maxillary glands slightly swollen.

I made no conclusive diagnosis but regarded the animal as showing symptoms approaching those of glanders and ordered its immediate removal to the Quarantine Station, there to be subjected to the Mallein test by Dr. L. E. Case. Dr. Case was further instructed to give the entire stables a careful and thorough disinfection, full particulars being given him as to the method, and all litter in the yards raked together and buried. The disinfecting took place under my supervision and the stables pronounced clean after a final inspection by Dr. Nörsgaard and myself.

Upon seeing the mule at the Quarantine Station Dr. Nörsgaard pronounced the case as one of Epizootic Lymphangitis and predicted the failure of the test to show a reaction, which diagnosis and prediction were substantiated by Dr. L. E. Case's report of no reaction from the Mallein test.

On June 17 the mule and a glandered horse belonging to P. M. Pond, which we had had at the station for some time and which had reacted to several methods of Mallein testing, were taken to the Channel wharf where they were shot and towed out to sea.

INSPECTION OF DOGS AT SCHOFIELD BARRACKS.

During the month of June four trips were taken to Schofield Barracks for the purpose of seeing if the rules and regulations of the Board, concerning the dog quarantine, were being carried out in the proper manner. Everything was found to be going O. K. and while the quarantine pens are not much to look at and loosely put together they seem to be holding the dogs all right at the present time, but if rabies should break out in any of them I hardly think that it would long resist the furious attacks which would be made upon it.

Imports of live stock at the port of Honolulu for the month of June:

- S. S. "Virginian," Seattle, June 3—
45 mules, 19 horses—Q. M. Dept.
22 mules, 50 horses—Chas. H. Bellina.
- S. S. "Lurline," San Francisco, June 5—
2 horses—Major Cheatham.
2 hogs—W. F. & Co.
2 cats—Mr. Clark.
9 crates poultry.
- S. S. "Sonoma," San Francisco, June 7—
13 crates poultry.
- S. S. "Wilhelmina," San Francisco, June 11—
4 crates poultry.
- S. S. "Manchuria," San Francisco, June 12—
1 dog—Harold Castle; quarantined for 4 months.
- S. S. "Honolulan," San Francisco, June 19—
3 Holstein bulls—Mr. Isenberg.
14 mules, 10 mares—N. H. Churchill.
2 hogs—W. F. & Co.
13 crates poultry.
- S. S. "Ventura," San Francisco, June 27—
1 dog (Boston bull)—Mr. Wood; quarantined for 4 months.
5 crates poultry—M. Gonsalves.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

Honolulu, July 31, 1912.

Dr. Victor A. Nörsgaard, Chief of Division of Animal Industry.

Sir:—I beg to submit herewith a report of the routine work of this Division:

TUBERCULOSIS CONTROL.

The following dairies were visited and cattle tested:

1st to 3d—M. Gomes—6 cows, all passed.

1st to 3d—J. P. Mendonca—1 cow, passed.

11th to 13th—Isenberg—2 cows, passed.

23d to 25th—Isenberg—179 cows, 3 bulls; 163 passed, 19 condemned.

26th to 29th—Isenberg—134 cows, 4 bulls; 120 passed, 18 condemned.

All reactions were typical and unmistakable; all were well defined and three were large enough to be easily seen across the corral and were, in fact, the largest swellings which I have so far observed. They were oval in shape and were, as near as one could judge, $1\frac{1}{2}'' \times 2''$ in size, firm to the touch but not hard, and exhibited no heat or pain, in fact, were typical reactions.

It has been a disputed point as whether or not more time should be allowed between the time of injection and the time of examination. The evidence gathered on this point during this last test practically settles the question in favor of a period of 72 hours elapsing before the examination is made.

In the bunch of 138 head seventy-two hours were allowed to elapse before an examination was made. On the forty-eighth hour the foreman of the ranch made a very careful examination and picked out fifteen reactors, the remaining ones, he declared, gave no evidence of a swelling of any description. When I made my examination, twenty-four hours later, I picked out eighteen which gave typical reactions. His fifteen corresponded with fifteen which I had declared tuberculous and I had found three more which he was emphatic in declaring had shown no indications of reacting on the forty-eighth hour. Thus the importance of the extra twenty-four hours.

Without doubt the majority of tuberculous animals can be picked out at the end of forty-eight hours, but as has been demonstrated there will be in some instances a few which will not show the characteristic reaction until a later time which makes it a necessity to wait seventy-two hours before making a final examination. By doing so nothing is lost and everything gained, a reactor cannot become lost as the swelling remains five or six days, but the entire test may be rendered useless if sufficient time is not allowed for its proper working.

GLANDERS.

Glanders has again made its appearance in, to all intents and purposes, an ownerless horse which had escaped from pasture and brought to the Kalihi Pound. This animal gave typical symptoms of glanders, there being a bilateral discharge from the nose, ulcers in the nasal septum and swollen sub-maxillary glands.

The animal was held in the pound for a few days in a vain attempt to discover the owner and while there was used for experiment in testing the accuracy of an intro-dermal Mallein test which I have had under consideration for some time, a test based upon the intra-dermal tuberculin test and designed to facilitate the testing of horse stock in the detecting and eradication of glanders. The details of this experiment and the test in general will be taken up in a future report.

The following is the list of importations of live stock at the port of Honolulu during the past month:

- S. S. "Hyades," Seattle, July 2
 - 22 mules, 2 horses—G. Schuman.
 - 18 horses—J. H. Wilson.
- S. S. "Lurline," San Francisco, July 3—
 - 3 polo ponies—Alexander & Baldwin.
 - 1 cat—Miss B. B. Cox.
 - 53 crates poultry.
- S. S. "Manchuria," San Francisco, July 4—
 - 1 crate white rats.
- S. S. "Wilhelmina," San Francisco, July 9—
 - 16 crates poultry.
 - 1 dog—Mrs. Bodrere—quarantined for 4 months.
 - 1 dog—Raymond Teal—quarantined for 4 months.
- S. S. "Shinyo Maru," Yokohama, July 15—
 - 2 dogs, 1 crate geese, 1 cat, 2 goats, 2 monkeys, 2 crates poultry, 1 parrot—Maurice G. Raymond.
 - 3 crates Japanese games—K. Ohashi.
- S. S. "Honolulan," San Francisco, July 17—
 - 6 horses, 1 crate chix, 1 colt—M. Ferreira.
 - 1 colt.
 - 1 Duroc-Jersey boar—Mr. Isenberg.
 - 2 dogs—W. F. & Co.—quarantined for 4 months.
- S. S. "Zealandia," Vancouver, July 17—
 - 3 dogs—Dr. James Judd—quarantined for 4 months.
- S. S. "Siberia," San Francisco, July 22—
 - 1 horse—Rosenberg Tank Co.
 - 12 crates poultry.
- S. S. "Hilonian," Seattle, July 22—
 - 30 Shropshire rams—A. W. Carter.

These rams were taken to the Quarantine Station where they were thoroughly dipped in a chloro-naptholeum bath and sheared before they started on their trip to Hawaii.

Schooner "Hackfeld," Germany, July 24—
1 dog—W. R. Shingle.

Was not subjected to quarantine as the required time of 120 days had been spent in transit, that is, 119 days were required to make the trip and the last day was spent on board ship at the dock.

S. S. "Lurline," San Francisco, July 31—

- 4 mules—City Mill Co.
- 30 " —Schuman Carriage Co.
- 34 " —Club Stables.
- 3 horses—Club Stables.
- 4 jacks—A. W. Carter.
- 10 cows—A. W. Carter (Hereford heifers).
- 1 bull—A. W. Carter (Hereford).
- 1 horse—W. F. & Co.
- 23 crates poultry.
- 3 crates hogs (Berkshire)—W. F. & Co.
- 3 monkeys.
- 3 crates pigeons.

The heifers and bull are now at the Quarantine Station where they will rest from their long journey. They will be carefully watched and tended to and finally sprayed with a disinfectant.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF FORESTRY.

REPORT FOR JUNE.

Honolulu, July 8, 1912.

Board of Agriculture and Forestry, Honolulu.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for June, 1912:

My own time during June, outside of routine work, was largely given to the preparation of reports on several forest matters and to getting ready for the use of the members of the Board data in connection with the beginning of a new fiscal period.

Under the date of June 13, I submitted to the Committee on Forestry a detailed report upon the condition of the forest in the Kau Forest Reserve, Hawaii, the result of an examination made in May. Other reports, upon forest reserve projects, await only the completion of technical descriptions of boundary.

The revival of active interest in street tree planting in Honolulu, together with the usual number of calls for advice from persons wishing to know how best to plant or care for the trees and shrubs on their grounds, kept the Forest Nurseryman busy during June. The plant distribution for this month, while not heavy in point of numbers, was made up of a fairly large number of orders, from various parts of the Territory. This part of the

work of the Division of Forestry is not very much in evidence, but in the course of a year it benefits a good many people. As usual, Mr. Haughs' report for the month is transmitted herewith.

At the end of June the collections of botanical material belonging to the Board of Agriculture and Forestry, with the cases in which they are housed, were transferred from the office of the Board to the new building of the College of Hawaii in Manoa Valley. The custody of the herbarium is turned over to the College of Hawaii as a loan, on the condition that the specimens shall be properly cared for and made available for use. This transfer of material marks the close of the active participation of the Board of Agriculture and Forestry in the botanical survey of the Territory, but Mr. J. F. Rock will continue to serve on the Board staff as Consulting Botanist. Incidentally it may be noted that good progress is being made on Mr. Rock's book, "The Native Trees of Hawaii," which is based on the material collected by him while exclusively in the employ of the Board of Agriculture and Forestry.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT FOR JULY.

Honolulu, August 1, 1912.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for the month of July, 1912:

During this month my own time has been divided between work in the field and in the office. I have made several inspection trips to various forest areas on the Island of Oahu, more particularly to government lands in Palolo, Lualualei and Waianae Valleys, and at Pupukea, as well as to privately-owned forest back of Waialua, Waianae and Kahuku in the well-being of which the government has an interest.

Toward the end of the month the Government Survey Office completed the technical descriptions of boundary of several forest reserve projects that had for some time been on the waiting list. This permitted the completion of my reports on these proposed reserves, which are now in the hands of the Board, or being typed for transmission.

TREE PLANTING.

During the month a number of corporations and individuals have given advance notice of their desire to secure seedling trees for planting out next winter. It is desirable that such applica-

tions be filed early, that there may be no delay in getting the plant material when the proper planting season arrives.

FOREST FIRES.

On June 26th a grass and brush fire occurred on the lot owned by Mr. Norman Campion in Palolo Valley. It is thought to have been started by children playing with matches. Fortunately the fire was put out by men living on adjoining lots before it reached the houses on the lot, or got away up the slope.

On July 20 and 21 a grass fire was reported from the lower slopes of the Koolau range near Wahiawa. Mr. W. M. Templeton, the local fire warden, states that it was controlled before doing serious damage. This fire was fought by cavalrymen from Schofield Barracks. Another fire in the same district, this time at the end of the Waianae range, is reported as having burned over an area of grass land below the point called Maili, on the evening of July 27th. This fire was also fought by soldiers from Schofield Barracks.

Beyond knowing that the district fire warden secured men to fight them, I have not yet got the details in regard to these fires.

With the continued drought in so many parts of the Territory it is incumbent upon all persons who have occasion to burn brush, or to make other fires in the open, to exercise unusual precautions not to let the fire get beyond control. In a dry time one cannot be too careful.

MR. HAUGHS' REPORT.

Following the usual custom, the report of the Forest Nurseryman, giving the details of that phase of the Division of Forestry's work, is submitted herewith.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

FOREST NURSERYMAN'S REPORTS.

Honolulu, July 1, 1912.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the principal work done during the month of June:

Nursery—Distribution of Plants.

	In seed boxes.	In boxes transplanted.	Pot grown.	Total.
Sold . . . . .	.....	50	360	410
Gratis	2,000	368	847	3,215
	<hr/> 2,000	<hr/> 418	<hr/> 1,207	<hr/> 3,625

Collections.

Collections on account of plants sold amounted to \$18.85.

Plantation Companies and Other Corporations.

From stock raised with labor supplied by plantation companies and other corporations we have received orders and supplied the following plants: 2,000 transplants in boxes and 300 pot grown.

Collecting Seed.

The two seed boys have been collecting around the city. The *Grevillea robusta* is now in season and considerable time will be required to get a sufficient quantity of this seed.

Experiment Garden, Makiki.

The two men have been transplanting and doing other routine work.

U. S. Experimental Planting, Nuuanu Valley.

The man employed for the purpose of taking care of the trees has been hoeing and clearing away grass.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

Honolulu, July 31, 1912.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the principal work done during the month of July:

Nursery—Distribution of Plants.

	In seed boxes.	In boxes transplanted.	Pot grown.	Total.
Sold		50	208	258
Gratis	11,250	350	766	12,366
	<hr/> 11,250	<hr/> 400	<hr/> 974	<hr/> 12,624

Collections.

Collections on account of plants sold amounted to \$10.80.

Plantation Companies and Other Corporations.

700 pot grown and 500 plants in transplant boxes have been distributed. An order for 12,000 Ironwood in transplant boxes to be delivered ready to set out in November has been received. We are now getting the trees to fill this order transplanted at the Makiki Station.

Seed Collecting.

The two seed boys have been collecting *Grevillea robusta* and other seed around the city, also assisting in packing up trees and transplanting on occasions when orders require to be filled in a hurry.

Experiment Garden, Makiki.

Building up a stock for the fall planting, also attending to the plants belonging to the different corporations, constitute the principal work done.

U. S. Experimental Planting, Nuuanu Valley.

For several months the want of moisture has kept us from finishing the planting of a few of the plots. We have at the Makiki Station plants for this purpose ready to set out and we intend to plant them when the ground becomes moist enough.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ENTOMOLOGY.

REPORT FOR JUNE.

Honolulu, June 30, 1912.

Hon. Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of June as follows:

During this month there arrived 32 vessels of which 19 carried vegetable matter. The usual careful inspection was made with the following results:

<i>Disposal with principal causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	793	12,972
Fumigated	9	179
Burned	29	89
Total inspected	8311	13,240

Rice Shipments.

24,672 bags of rice arrived from Japan during the month of June and were passed as free from pests, after careful examination.

Pests Intercepted.

36 packages of fruit and 31 packages of vegetables were confiscated from passengers and immigrants during the month. Much of this material was found infested. Several shipments of plants arrived from Manila on which were found ants, millipedes, cockroaches and scale insects. 21 boxes of peaches from California were infested with the peach moth (*Anarsia lineatella*) and were destroyed by burning in the incinerator.

Hilo Inspection.

Brother M. Newell reports the arrival of six vessels, 4 of which carried vegetable matter consisting of 127 lots and 1,757 packages which were passed as free from pests, except one package of plants which was infested with mites and maggots and was destroyed.

Inter-Island Inspection.

During the month of June 58 steamers were attended to and the following shipments were passed on:

410 bags of taro,
11 bags cocoanuts,
45 packages of various plants.

Total 466 packages inspected and passed.

The following packages were refused shipment:

175	packages of various fruits,
21	“ vegetables,
8	“ plants.

Total 204 packages inspected and refused shipment.

Among the fruit 3 packages of mangoes were found infested with the maggots of the fruit fly.

Respectfully yours,

E. M. EHRHORN,
Superintendent of Entomology.

REPORT FOR JULY.

Honolulu, July 31, 1912.

Hon. Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of July as follows:

During the month there arrived 38 vessels of which 23 carried vegetable matter. The usual careful inspection was made with the following results:

<i>Disposal with principal causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	1,054	19,850
Fumigated	8	18
Burned	27	60
Total inspected	1,089	19,928

Rice Shipments.

29,648 bags of rice arrived from Japan during the month of July. These were passed as free from pests after careful examination. Owing to the possibility of some infested shipments arriving at this season of the year your Superintendent called on the leading importers of rice and asked them to unite on a systematic inspection at the port of Kobe, preferably under government supervision, and I also urged them to do their utmost to prevent any rice which has not previously been fumigated from being shipped here as such rice, if at all infested and placed on board the steamer will soon infest all the rice which has been fumigated and with which it would come in contact. The Japanese Merchants' Association has taken the matter up in a very business-like way and through their request the Japanese Consul has cabled his government about the matter. The Merchants' Association has also forwarded letters explaining the situation. Owing to the settling of the Channel wharf, the large rooms in

which we have been able to fumigate all infested rice and other produce arriving here, are now in such a leaky and unsafe condition as to render them worthless for our work. We are at a loss to know just what to do in case any very large infested shipment of rice or other produce should arrive here and it might be necessary for the Board to provide some large tight room for our work in the near future.

Pests Intercepted.

18 packages of fruit and 42 packages of vegetables were confiscated from passengers and immigrants during the month. Several packages contained colonies of ants and had to be fumigated before delivery.

Queen Bees.

During the month 3 Queen bees arrived by mail with attached certificates of inspection required by law. The package and attendant bees were destroyed after the Queen was taken out.

Beneficial Insects.

Two lots of carabid beetles were sent to the Board of Agriculture and Forestry by Dr. Burgess of the Gypsy Moth Parasite Laboratory, Melrose Highlands, Mass. These arrived in fairly good condition and have been liberated.

Inter-Island Inspection.

During the month of July, 70 steamers were attended to and the following shipments were passed:

- 41 packages of plants (mostly forest trees),
- 475 bags taro,
- 1 bag taro tops,
- 4 bags cocoanuts,

521 packages inspected and passed.

The following packages were refused shipment:

- 322 packages of various fruits,
- 25 " of vegetables,
- 8 " of plants.

355 packages inspected and refused shipment; 2 packages of tomatoes were found infested with maggots.

The postoffice department has revised the regulations concerning the transmission of insects, plants, etc., requiring a certificate of inspection of all shipments before they are forwarded by the local postoffice. This is another burden which has been upon the many duties of your Superintendent and will

cause some annoyance and inconvenience to the general public. I attach herewith a copy of the regulation.

New Postal Regulations.

The following statement of the revised regulations of the post-office department concerning the transmission of insects through the mails has been kindly supplied by Dr. L. O. Howard, Chief of the Bureau of Entomology:

"Queen bees and their attendant bees, when accompanied by a certificate from a State or Government inspector that they have been inspected and found free of disease; beneficial insects, when shipped by departments of entomology in agricultural colleges and persons holding official entomological positions; other live insects, when addressed to the Bureau of Entomology of the United States Department of Agriculture, to departments of entomology in State agricultural colleges and to persons holding official entomological positions, and dried insects and dried reptiles may be sent in the mails when so put up as to render it practically impossible that the package shall be broken in transit, or the persons handling the same be injured, or the mail bags or their contents soiled.

"Nursery stock, including field-grown florists' stock, trees, shrubs, plants, vines, cuttings, grafts, acions and buds (which may carry injurious insects) may be admitted to the mails only when accompanied by a certificate from a State or Government inspector to the effect that said nursery stock has been inspected and found free from injurious insects."

Hilo Report.

Brother M. Newell reports the arrival of 7 steamers carrying vegetable matter amounting to 109 lots and 1,642 parcels, all of which are found free from pests. He comments on the fine appearance and condition of the California fruit.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

THE SOIL AND THE PLANT.

Dr. E. J. Russell, of Rothamsted Experimental Station, has a paper in *Science Progress*, reviewing some recent American hypotheses which seem to upset several established points as to soil. Dr. Russell, after a careful examination, arrives at the following conclusion which indicates the differences as well:

The outstanding differences between Whitney's hypotheses and those more generally accepted may therefore be reduced to three:

(1) Whitney supposes all soils to be chemically alike in that all are made up of the same rock material; consequently the soil solution is the same in all cases. Other chemists, on the other hand, consider that the soil is more complex, containing colloidal decomposition-products and a solution which not only differs in composition in different soils but also shows local variations in composition in different parts of the same soil.

(2) He further supposes that variations in concentration of the soil solution have no effect on the rate of growth of plants and that in consequence all soils are equally rich in plant food; added fertilizers owe their value to other than nutritive effects.

(3) He considers that infertility must therefore be due to other causes than lack of nutritive compounds; dismissing considerations of nutrition altogether, he supposes instead that infertility arises from the presence of toxic organic compounds, some of which at any rate may be plant excretions. We, on the other hand, attach great importance to the nutritive functions of soil constituents and of added fertilizers; while some of us agree that part of the infertility of "sour" soils may be due to toxic substances (and apparently the soils examined by Whitney and his colleagues were "sour" soils), we cannot accept the view that plants excrete toxic substances.

There is no doubt that the work of the Soil Bureau has suffered from leaving out of consideration all biological changes going on in the soil. The decomposition by micro-organisms of the residues of previous generations of plants gives rise beyond doubt to quantities of plant food, yet the function of this nutrient material is never considered; instead, attention is concentrated on possible toxic substances to the exclusion of useful substances. Thus the field of view is unduly restricted.

The investigations have, however, served a very useful purpose in stimulating inquiry and they have brought home the fact that the relationships between soils and plants are complex, it is no longer possible to take the old narrow view that the soil simply supplies food to the plant: the earlier papers compelled recognition of the fact that the size of the soil particles which regulate the water and air supply is more important than their chemical composition, and consequently that mechanical analysis is more useful than chemical analysis in characterizing soils; the later papers direct attention to possible toxins of which we may have some in our own "sour" soils. We can find much to criticise in the details of the experiments and still more in the conclusions drawn from them; not infrequently the facts themselves are in dispute. Above all we should like to see a re-examination of the fundamental positions based on definite crucial experiments and consideration of alternative hypotheses. But, whether further work support their hypotheses or not, Whitney, Cameron, Schreiner and their colleagues have made agricultural chemists re-examine their ideas on the soil, and such a reconsideration must in the end ad-

vance the subject, however troublesome or superfluous it may at the time appear.

FLOWERS OF THE PAPAYA.

It is well known in the West Indies that, although the male and female flowers of the papaya tree are usually produced on separate trees, flowers possessing both characteristics (hermaphrodite flowers) and arising in female inflorescences, are often found, and that it is also possible to cause a "male" tree to bear female flowers and ultimately fruits, by cutting it back.

L'Agriculture Pratique des Pays Chauds for October, 1911, gives attention to an exceptional case, where hermaphrodite flowers arose in a male inflorescence, in a note which describes a plant in the Jardin Colonial in Upper Guinea, near Kindia. This plant had already borne male flowers, without fruiting, when suddenly at its full flowering time, it produced long axillary inflorescences containing gamopetalous flowers with normally developed stamens and a rudimentary ovary. At the time of reporting, three fruits had appeared, each about 4 inches long, and soon after a young fruit about half as large. One of the fruits was plucked, and was found to contain numerous normal ovules. It was not expected, however, that these would attain a true maturity, as their stalks were exhibiting a yellowish tint which indicated premature ripening.

In presenting the note, mention is also made of the observation of a similar phenomenon, about 1887, by a French authority and by travelers in Central Africa.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207 HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

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EDITORIALS.

The Massachusetts Forestry Association issues the following boosting card:

Here is a little state which we think is mighty fair;
It has tried to save its forests as a man would save his hair;
But, alas, 'tis bald in places, nothing left but stumps or embers,
All because this 'society doesn't have enough of members.
Are you one?

From the L. L. Poates Publishing Company, 22 North William street, New York, has been received an Atlas of the World, which is got up in very neat and clear style. It is represented to have "193 pages of maps, alphabetical index of states and countries, besides the states with their counties and important cities and towns with their populations, according to the 1910 United States census, and the principal cities of the world." As Honolulu is not found among the "important cities and towns," even, let alone "the principal cities," in this book, it is a fair presumption that the work is composed to some extent at least of stale material dug out of older publications. There can be no excuse for leaving Honolulu out. Hawaii as a whole, it may be added, is presented in this Atlas only by a contemptible little map.

Tropical Life (London) for August says: "One of our Hawaii friends writes us that experimental tappings of Ceara rubber trees out there under official supervision yielded 14 ounces per tree, five to six years old. This was obtained during the course of a year, each tree being tapped sixty times, or an average of once in five working days."

A circular of the Porto Rico Agricultural Station says that bees are very fond of working the blossoms of the cocoanut palm, and are ready to start work directly the blossom sheath begins to open. So many bees work on a blossom that their buzz resembles the noise made in swarming. Although the cocoanut does not furnish as much honey per tree as the royal palm, in the aggregate the amount obtainable must be much more, and

the bees seem very ready to work the cocoanuts. Coffee blossoms are said to yield food for the bees very freely.

Reviewing a handbook on education, by H. Osmond Newland, founder of the British West African Association and the Egyptian Association, Tropical Life bewails the kind of education the parents of Greater London are forced to accept under pains of fines and imprisonment if they do not make the children undergo it. For all but perhaps 50 per cent of the children, the magazine sets forth, the existing system tends to force them "to misery and want." What it says further in the following quotation is worthy of study in Hawaii, where, happily, some people and the legislature have already taken up the central idea presented: "Our present system encourages, if it does not actually force, countrymen and townsmen alike to flock into the cities, whereas what this empire is crying out and starving for is decentralization, is the need of not only driving our surplus population out of the cities, but also out of the country, to go elsewhere to earn their living and increase the trade of this country. The only compulsion we believe in is compulsion to work. It is the only thing the law does not insist upon. It compels you to be educated in a way that, with at least 50 per cent of very poor, leads to nowhere; it punishes you if you do not insure; if you do not call in the doctor when ill; if you prefer to starve than to live on charity; but to train you to be of a real help to your country and to yourself by teaching you agricultural industries, and forcing those who cannot earn the much discussed minimum wage in the large towns and cities, which many are not worthy of, to go back to the land and earn what they can, and all they are worthy of, has not entered into the minds of our educational experts, who teach you what they want you to learn, not what you, the student, require to know."

A report of the proceedings of the West Indian Agricultural Conference, 1912, continued in No. 3, Vol. XII, of the West Indian Bulletin, contains some papers on sugar which should be of much interest to Hawaiian planters.

"Insect Pests of the Lesser Antilles," by H. A. Ballou, M. Sc., an entomologist on the staff of the West Indies department of Agriculture, has been received. It is a pamphlet of 210 pages, and is copiously illustrated. "The Mediterranean fruit fly," the work says, "is perhaps the most widely distributed of the fruit flies."

FOREST RESERVES.

REPORTS OF THE SUPERINTENDENT OF FORESTRY MAKING RECOMMENDATIONS WITH REGARD TO THREE FOREST RESERVES.

On Island of Molokai.

Honolulu, July 25, 1912.

Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I have the honor to submit as follows a report recommending that a forest reserve be created on the Island of Molokai, County of Maui:

OBJECT.

The object of this proposed forest reserve is to protect and permanently to maintain the forest cover on the upper mountainous parts of the island, so that the sources of water—the springs and streams thereon—may be safeguarded, and as far as possible the regularity of their flow assured.

All along the lee shore of Molokai at the lower elevations, but especially near Kaunakakai, is much land that is potentially of high value for intensive agriculture, could it be brought under irrigation. Attempts to secure water on a large scale from wells have proved unsuccessful. Various plans for the development of the mountain water have been proposed,* but up to the present time only comparatively small quantities of water, sufficient only for watering live stock, have actually been brought out of the hills.

Sooner or later it is almost certain that some practicable plan will be evolved whereby the mountain water can be collected and led out to where it is needed. Looking forward to that time, it is expedient that provision be made now for keeping the watershed in the best possible condition.

This is a matter which interests all the owners of the uplands, private parties as well as the government, for any comprehensive program for the systematic development of the mountain water on Molokai would doubtless cover the entire island. The chief value of these upper lands is as producers of water. The owners should see to it that when the proper time comes to dispose of it, the largest possible quantities of water are ready to be sold. Because it will help to accomplish just this end is the main purpose in setting this section apart as a forest reserve.

* Especially in a report by Waldemar Lindgren, "The Water Resources of Molokai"; U. S. Geological Survey, Water Supply Paper No. 77; Washington, 1903.

LOCATION AND AREA.

The area proposed to be set apart lies mauka of a line varying in elevation from 1500 to 2000 feet that circles the eastern half of the island. The total area included is 44,674 acres, of which 13,268 acres, 30 per cent., is land belonging to the Territorial government. Of the remainder, that in private ownership, a large share is held by a few individuals or corporations. So far as it has been possible to ascertain, almost all of the owners of forest land on Molokai are in sympathy with the objects for which the reserve is created. Most of them have expressed their intention of cooperating more or less actively in making the reserve effective on the ground.

The various lands contained in the proposed Molokai Forest Reserve, with their area and ownership, are shown in the following table. The areas were compiled by the Government Survey Office, as a part of the official description:

Name.	Area acres	Owner.	Lessee.	Lease No.
Iioli	156.0	Meyer Bros.		
Naiwa	70.0	Meyer Bros.		
Kahanui (L. C. A. 7755)	317.0	Meyer Bros.	American Sugar Company	117
Kalamaula	1621.0	Government		
Kahanui (Grant 3437)	1048.0	Meyer Bros.		
Kaunakakai	965.0	American Sugar Company	American Sugar Company	117
Kapeken	220.0	Government		
Kamilolola 1	490.0	{ Government	American Sugar Company	516
Kamilolola 2	550.0			
Makakupaina mauka	490.0			
Makakupaina makai	654.0	American Sugar Company		
Kawela	3850.0	American Sugar Company		
Makolehu	253.0	Mrs. F. Foster	L. H. Deo	
Kamalo	1600.0	Bishop Estate	Meyer Bros.	
Kapualoi				
Kamueli	923.0	Austin Estate		
Wawaia				
Puuahala	163.0	Government	(Unleased)	
Maunola	33.0	Bishop Estate		
Keawanui	182.0	Bishop Estate		
West Ohia	172.0	Kumu (?)		
East Ohia	220.0	Government	A. Rodrigues	655
Manawai	416.0	Th. Meyers (?)		
Manawanui	182.0	{ Government	C.. Kaanoi	} 702 701
Ualapue	194.0			
Kaluasaha	694.0	H. R. Hitchcock		
Mapulehu	1007.0	C. C. Conradt		
Ili o Punaula	152.0	Mrs. E. M. Nakuina		
Pukoo	124.0	Government	(Unleased)	
Kupehe	63.0	Mrs. C. B. Buchanan		
Ahuino 1	96.0			
Ahuino 2	100.0	L. Weinzheimer		

Name.	Area acres	Owner.	Lessee.	Lease No.
Kawaikapu (Grant 3108).....	67.0	Mrs. E. M. Nakuina		
Kainalu (Grants 3730:2 and 1140:1).....	572.0	Vincent, Bowen & Co.		
Puelene	14.0	Liliuokalani Trust		
Puniuohua 1	1.5	{ Vincent, Bowen & Co.		
Puniuohua 2	2.5			
Waialua	627.0	Hui		
Moanui	282.0	Tollefsen & Christensen		
Honouliwai	378.0	Government		
Honoulimaoloo	175.0	Kapiolani Estate	(Unleased)	
Lupehu (Grant 1836).....	83.0	J. F. Brown half; J. Jones half	(in dispute)	
Pohakupili	9.0	Mrs. Paia Naki		
Mokaa	218.0	Estate of Mana King		
Kēepukaunu	16.0	Hui (J. F. Brown in part)	Mr. J. F. Brown	
Keopukaloa	810.0	Hui		
Halawa	7190.0	Bishop Estate		
Wailau	8540.0	Government		
Pelekunu (including grants and kuleanas)	4512.0	J. B. Castle	A. C. Dowsett	540
Waikolu	3400.0	Board of Health.	Valley belongs Leper Settlement	
Makanalua	142.0	Board of Health.	Valley belongs Leper Settlement	
Kahanui (Grant 3539 to Meyer)	215.0	Meyer Bros.		
				44674.0

The data in regard to ownership were compiled after consultation with various persons familiar with Molokai.

The Boundary.

In common with the usage in other Hawaiian Forest Reserve projects, the boundary of the proposed Forest Reserve has been drawn across both government and privately owned lands so as to include all the area which in the judgment of the Superintendent of Forestry should be permanently maintained as forest. Starting on the Molokai Ranch boundary, at a point near the pali overlooking the Leper Settlement and following the forest fences across the Molokai Ranch, the line runs along the southeastern slope of the Molokai mountain as far as Halawa gulch, from one to another of the triangulation stations erected at the time the island was surveyed by the government. These points are located on the ridges, practically at the edge of the existing forest. The line runs mauka of the heads of the greater part of the many small lands along the southeast coast.

Beyond Halawa the line is one of natural boundaries. It follows the sea coast but excludes, by description, "all the cultivated or agricultural land in the valleys of Halawa, Wailau, Pelekunu and Waikolu, all land in Waikolu, and Waihanau that may be used or required for public purposes and all flat land along the shore at the foot of the bluffs."

At the Settlement the line runs up the pali, skirts the top of the bluff for a way, and connects with the Molokai Ranch fence by crossing the fee simple lands of the Meyer Brothers.

The Meyers' Lands.

With the exception of the Meyers' lands, practically all the areas included within the reserve is now under forest or in process of being reforested. Most of the forest at the east end of the island is now, of course, subject to cattle grazing, but almost all the larger owners have expressed their intention sooner or later of fencing off the forest. The Meyers' lands, on the contrary, are now used regularly for grazing, and it is the intention of the owners to continue so to use them. The larger part of the Meyers' lands within the forest reserve limits are now open.

In my judgment it would be for the best interests of the island as a whole were these particular lands again got under forest, more especially the portion of Kahanui bordering the great Waikolu Gulch, through which land run the small gulches that unite to form the Waihanau Gulch that comes out above the Leper Settlement on the land of Makanalua.

From a water supply standpoint this is a highly important portion of Molokai, because while the area is small, only about one square mile, it is subject to heavy rainfall, while from its location the Waihanau is a stream that could readily be diverted and put to use. Speaking of this stream, the Waihanau, Lindgren says (l. c. p. 31): "Swamps line the borders and much water comes in

from springs on the sides of the abrupt canyon in which it flows. . . . I conclude that the stream can be relied on for 3,250,000 gallons per 24 hours from November 1 to June 1, for 1,000,000 gallons during June and July and for at least 100,000 gallons from August 1 to November 1." When water is as badly needed and as valuable as it is on Molokai, it is not good policy to use such an important catchment area as this for grazing. On a good portion of upper Kahanui the native forest would probably come back naturally if cattle were excluded. Lower down artificial planting would be necessary. On the lower portion of Kahanui mauka, but still within the line of the proposed reserve, are "Meyer's Lake" and one or two other possible reservoir sites.

Theoretically, the proper thing would be for the Territorial Government to take over this land, at a fair valuation, but practically there is no fund available for making such purchases. Owing to complications resulting from the fact that the Meyers' lands are parts of the undivided estate of the late R. W. Meyer, under the terms of a will which provides that the estate cannot be finally settled during a term that has yet many years to run, it would not be easy to effect a transfer of title. But, possibly, in time, were a Molokai water company formed, it might be possible through a long lease to control the lands for a sufficient time to make it pay to get a new forest started. In the meantime the fact that a forest reserve line has been drawn across it on the map as a guide for future action, does not affect the Meyer Brothers in practice if they see fit to continue to use their lands for grazing.

At present Kahanui is separated from the Molokai Ranch Company's lands by well kept fences. Should some plan of full reservation not previously have been effected, provision for the maintenance of this fence should be made when the present lease of the adjoining Government land of Kalamaula expires, in 1918. Similar provisions of fence up-keep should be included in the leases of all the other Government lands that run into the Molokai Forest Reserve.

Protection of the Forest.

In the matter of protecting and extending the forest on the Molokai mountain considerable interest has already been shown. Chief among those who are alive to the advantages of such action is the American Sugar Company, locally known at the present time as the Molokai Ranch, which for a dozen years now has maintained a forest fence across the upper lands, including both those held in fee simple and those held under lease from the Government. This fence, which is approximately 8 miles in length, was built in 1898 and 1899, voluntarily by the ranch company. Since that time cattle have been kept off the mountain, except for one paddock. And within the last two years that, too, has been given up.

That the lands at the east end of the island may get the full

benefit from the forest reserve requires that the forest line be fenced, except where there are natural barriers all along its course. On the few lands that belong to the Government, provision for fencing can be made when the lower end of the land comes again to be leased. This has already been done in the case of a couple of Government leases. Similar action will probably be taken by the Bishop Estate. Some of the other private owners would be willing to fence off their upper lands, but are unable to do so because of the expense. Under the circumstances about all that can be done just now is to point out where the line ought to be and lend what encouragement is possible to the construction of various stretches of the fence from time to time.

Owing to the configuration of the slope the line to be fenced consists for the most part of comparatively short stretches of fence, across ridges, between the impassable sides of gulches.

It is proper here to recall that at the time of the building of the Molokai Ranch forest fence, from 1898 to 1900, considerable money was spent by the Molokai Ranch Company in killing off the deer* and in getting out wild cattle that were then at large in the woods. In recent years enough deer hunting has been done practically to keep pace with the yearly increase. Deer are also found, and hunted, on the forest lands at the east end of the island.

In this connection, in view of the damage liable to result to the native forest from deer, the Territorial Government is on record as holding that in Hawaii deer are to be considered as being in the same class with goats, animals to be regarded as pests to be got rid of.

There are several large bands of goats on Molokai. The Molokai Ranch Company has lately had several systematic goat drives and is using other means to clear their mountain lands of this enemy of the forest. By these efforts the bands are gradually being reduced in number, but it is work that ought steadily to be continued until the goats are exterminated.

It should also be noted here that for the purpose of bettering the water holding condition of the catchment basin, forest planting is now being done by the Molokai Ranch Company on the mountain, at Maunahu'i, near Kahanui, on the land of Kaunakakai. In many places above the forest fence the native vegetation is coming back naturally. There it was felt to be desirable to expedite matters by artificial planting.

RECOMMENDATIONS.

For the reasons set forth in the foregoing pages I do now recommend that the Board of Agriculture and Forestry request the Governor of the Territory, in accordance with the usual procedure, to create a forest reserve on the Island of Molokai, to be

* Introduced from the Orient and turned loose on Molokai during the reign of King Kamehameha V, in the late sixties.

known as the Molokai Forest Reserve, and to set apart all government lands that lie within its boundaries.

Accompanying this report is the official description of the boundary of the proposed Molokai Forest Reserve, prepared by the Government Survey Office, together with a blue print of the eastern half of the island showing the location of the Reserve.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

MOLOKAI FOREST RESERVE.

Island of Molokai.

Beginning at a point in the land of Ioli on the top of the pali, said point being due north of Government Survey Trig. Station "Puu Olelo";

1. Thence 3300 feet, more or less, due south across the lands of Ioli and Kahanui (Grant 2709, L. C. A. 7755) to Government Survey Trig. Station "Puu Olelo" in the land of Naiwa;
2. Thence 2000 feet, more or less, in a southwesterly direction across the lands of Naiwa and Kahanui (L. C. A. 7755) to a point on the boundary of Kahanui (L. C. A. 7755) and Kalamaula;
3. Thence 60 feet, more or less, in a southwesterly direction along the boundary between Kahanui (L. C. A. 7755) and Kalamaula;
4. Thence 2440 feet, more or less in a southwesterly direction along the boundary between Kahanui (L. C. A. 7755) and Kalamaula;
5. Thence 3400 feet, more or less, in a southwesterly direction along the boundary between Kahanui (L. C. A. 7755) and Kalamaula to where the forest fence begins;
6. Thence 1000 feet, more or less, in an easterly direction along forest fence across the land of Kalamaula;
7. Thence 2000 feet, more or less, in an easterly direction along forest fence across the land of Kalamaula;
8. Thence 3000 feet, more or less, in a southeasterly direction along forest fence across the land of Kalamaula;
9. Thence 2250 feet, more or less, in a southeasterly direction across the land of Kalamaula along the forest fence;
10. Thence 3300 feet, more or less, in a southeasterly direction across the land of Kalamaula along the forest fence to a point on the boundary of Kalamaula and Kaunakakai;
11. Thence 16300 feet, more or less, in a general southeasterly direction across the lands of Kaunakakai Kapaakea, Kamiloa 1 and 2, Makakupaia mauka and Makakupaia makai and along the forest fence to a point which is 2800 feet directly south of Government Survey Trig. Station "Makakupaia" in the land of Makakupaia makai;
12. Thence 10600 feet, more or less, in a southeasterly direction across the lands of Makakupaia and Kawela along the forest fence;
13. Thence 4000 feet, more or less, across the land of Kawela along the forest fence to a point on the boundary of Kawela and Mokolelau, said point being 4400 feet, more or less, southwest of Government Trig. Station "Puu Kolekole";

14. Thence 2800 feet, more or less, in a southeasterly direction across the land of Makolelau to the head of the land of Kapuakoolau;
15. Thence 8500 feet, more or less, in an easterly direction across the land of Kamalo to a point on the ridge on the eastern boundary of Kamalo, said point being 2000 feet south of Government Survey Trig. Station "Kaapahu";
16. Thence 9100 feet, more or less, in a general southeasterly direction across the lands of Kapualei, Kumueli, Wawaia, Puaahala, Kaamola and Keawanui to a point 1000 feet south of Government Survey Trig. Station "Ohianui" on the last-named land;
17. Thence 9300 feet, more or less, in a general northeasterly direction across the lands of Keawanui, West Ohia, East Ohia, Manawai, Kahananui, Ualapue and Kaluaaha to a point 500 feet, more or less, south of Government Survey Trig. Station "Kaluaaha" on the last-named land;
18. Thence 5600 feet, more or less, in a general northeasterly direction across the lands of Kaluaaha, Mapulehu and the Ili of Punaula to Government Survey Trig. Station "Pukoo" on the west boundary of Pukoo;
19. Thence 3000 feet, more or less, in a general northeasterly direction across the lands of Pukoo, Grant 1135, Apana 3, Kupeke and Ahaino 1 to Government Survey Trig. Station "Ahaino" on the boundary between Ahaino 1 and 2;
20. Thence 8250 feet, more or less, in a general northeasterly direction across the lands of Ahaino 2, and Honomuni to the head of the land of Kamanoni, thence continuing in the same direction across the lands of Kawai-kapu, Kainalu, Puelelu, Puniuohua 2 and Puniuohua 1 to Government Survey Trig. Station "Wai-alua" on the west boundary of Wai-alua;
21. Thence 8100 feet, more or less, in a northeasterly direction across the lands of Wai-alua, Moanui and Honouliwai to Government Survey Trig. Station "Moanui";
22. Thence 5200 feet, more or less, in a northeasterly direction across the lands of Honouliwai, Honoulimaloo, Lupehu, Pohakupili and Moakea to a point on a small peak a short distance south by east of Government Survey Trig. Station "Halawa";
23. Thence 4050 feet, more or less, continuing on the same northeasterly line across the lands of Moakea, Keopukauku and Keopukaloa to a point on the edge of the pali of Halawa called Koholua;
24. Thence 5400 feet, more or less, in a northwesterly direction across Halawa Valley to the Government Survey Trig. Station "Kawaikapu";
25. Thence 3450 feet, more or less, in a northerly direction to the Government Survey Trig Station "Apuu";
26. Thence 650 feet, more or less, in the same direction to the sea coast;
27. Thence along the sea coast to the boundary between Halawa and Wailau;
28. Thence along the sea coast to the boundary between Wailau and Pelekunu;
29. Thence along the sea coast to the boundary between Pelekunu and Waikolu;
30. Thence along the seacoast to the boundary between Waikolu and Kalawao;

31. Thence along the boundary between Waikolu and Kalawao to top of pali being the intersection of the boundaries of Waikolu, Kahanui (Grant 3437) and Kalawao;
32. Thence along the top of pali between the boundaries of Kahanui (Grant 3437) and Kalawao to the southwest corner of Kalawao;
33. Thence along the top of the pali between the boundaries of Kalawao and Kahanui (Grant 3539 to Meyer) to a point between the boundaries of Kalawao and Makanalua called Alae;
34. Thence along the top of the pali between the boundaries of Kahanui (Grant 3539 to Meyer) and Makanalua to a point due east from the boundaries of Kalamaula and Kahanui on the westerly boundary of Makanalua;
35. Thence due west across the Waihanau Valley to the westerly boundary of Makanalua and the boundary point between Kalamaula and Kahanui;
36. Thence along the top of the pali between the boundaries of Makanalua and Kahanui to a point between the boundary of Makanalua and Kalaupapa called Iliilika;
37. Thence along the top of the pali along Kalaupapa to the point of beginning.

Containing an area of 44,674 acres.

Excepting and reserving therefrom all the cultivated or agricultural land in the valleys of Halaawa, Wailau, Pelekunu and Waikolu, and all land in Waikolu and Makanalua that may be used or required for public purposes, and all flat land along the shore at the foot of the bluff.

Addition to Waianae-kai Reserve.

Honolulu, July 26, 1912.

Committee on Forestry, Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I have the honor to submit as follows a report recommending that the Waianae-kai Forest Reserve, District of Waianae, Island of Oahu, be increased by the addition of an area of 396 acres, lying in the upper middle part of Waianae Valley.

The Waianae-kai Forest Reserve was created by proclamation of Gov. G. R. Carter on September 7, 1906. It now embraces a total area of 3257 acres, of which 3150 acres, 97 per cent., is Government land. The Reserve is made up of two classes of land, the forested slopes of the main ridge of the Waianae Mountain and the more or less arid section in the upper part of the Waianae Valley and on the sides of the lateral ridges running down toward the sea.

The object of the reserve, as stated in my report on the matter in 1906, is:

“by the re-establishment and maintenance of a forest cover, to assist in securing a more regular flow in the springs and brooks on the land, and to put to economic use areas which from their topography and situation are incapable of being profitably used for any other purpose than producing trees.”

The proposal now is to include in the forest reserve an additional area of land of the semi-arid type (outlined on the accompanying blue print in colored pencil) for the reason that it will serve the Territory better if made a part of this forest reserve than if it is used in any other way.

The solution of the question of the right use of the Government land in Waianae Valley turns essentially on the supply of water. Were a greater quantity available much more of the valley might be devoted to intensive agriculture than is now possible. As it is the lower lands, now mainly cultivated in sugar cane, carry the prescriptive right from ancient times to practically all the water in the regular flow of the stream. From the configuration of the valley it does not appear feasible to construct storm-water reservoirs except at prohibitive expense.

This portion of Waianae is too dry to permit the growing of agricultural crops without at least some irrigation. About the only other use is grazing and to such use of this particular area there are several objections. First, because being somewhat isolated, it is too small to be of much value as an independent paddock. Second, because its use for grazing would render liable the continuation of trespass by cattle on the forest reserve, which in the recent past it has been found difficult to control, and third, because with the outlook that exists at Waianae for getting forest planting started, it appears that in any event on this particular tract a better showing of returns to the Government could be made from trees than from cattle.

As has been said by me in earlier reports on this valley, the Waianae Plantation Company has for some years been carrying on, at its own expense, forest planting on the Waianae-kai Forest Reserve. As a part of an agreement regarding the use of certain waters rising in the forest reserve, the settlement of which is now pending in the Land Office, the Waianae Company is ready to undertake the planting of additional areas and, moreover, to build and maintain a fence on the lower boundary of the proposed addition and in such other places along the borders of included kuleanas as may be necessary efficiently to protect the forest reserve.

The area now proposed to be set apart was cut up into lots when the Waianae Valley was surveyed a few months ago for the so-called Pahoia Homestead subdivision. It was, however, never offered to the public, being withdrawn on the grounds, as above set forth, that it would be of greater advantage to the Valley as a whole if added to the Forest Reserve. The land is now under lease (No. 602, expiring July 1, 1913) to the Waianae Company. This whole question has received the personal attention both of the present and of the last Commissioner of Public Lands. Both favor the project here proposed.

For all these reasons I therefore do now recommend that the Board of Commissioners of Agriculture and Forestry approve this project and request the Governor of the Territory to set

apart, in accordance with the regular usage, the portion of the Government land of Waianae-kai described below, as an addition to the Waianae-kai Forest Reserve. Following is the technical description of boundary prepared by the Government Survey Office:

ADDITION TO WAIANAE-KAI FOREST RESERVE, WAIANAE,
OAHU.

Beginning at Government Survey Trig. Station "Kauaopuu" as shown on Government Survey Registered Map No. 2501 and running by true azimuths:—

1. 92° 37' 2034.0 feet along ridge to a stake;
2. 95° 06' 626.6 feet to a + on rock at spur;
3. 64° 40' 1057.5 feet to a + on rock at the East corner of Pahoa L. C. A. 7713 apana 1 to V. Kamamalu;
4. 124° 08' 688.5 feet along Pahoa L. C. A. 7713 apana 1 to V. Kamamalu to a stake;
5. 116° 26' 733.4 feet along Pahoa L. C. A. 7713 apana 1 to V. Kamamalu and along Lot 49 to a + on rock at the North corner of Lot 49;
6. 60° 00' 244.1 feet along Lot 49 to an iron pin;
7. 123° 45' 868.4 feet across road and along Lot 15 to an arrow on rock on east line of Forest Reserve;
8. 213° 33' 4445.3 feet along Forest Reserve to a + on rock at corner of stonewall;
9. 249° 51' 825.0 feet along stonewall along Forest Reserve to an iron pipe;
10. 245° 14' 955.0 feet along stonewall along Forest Reserve to + on rock known as Trig. Station "Kolealilii."
11. 342° 01' 5425.0 feet along Forest Reserve to the point of beginning. Area 396 Acres.

Excepting and reserving therefrom all grants and L. C. Awards and rights-of-way 8 feet wide for the 4-inch water supply pipe and for a 12-inch electric water power pipe within this lot.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

Creation of Kula Reserve.

Honolulu, August 1, 1912.

Committee on Forestry, Board of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen:—I have the honor to submit as follows a report recommending the creation of a forest reserve in the District of Kula, Island and County of Maui, which I propose be called the Kula Forest Reserve.

The area in question is a tract of 6075 acres lying on the western slope of Mt. Haleakala, between a line drawn along the slope at

an elevation of approximately 5000 feet and the crest of the mountain extending from, and including the land of Waiakoa to the southern extension of the main ridge.

The proposed reserve is made up of both government and privately owned lands. The former, 5069 acres, constitutes 83% of the total area. None of the government land is now under lease.

Included in the proposed reserve is the Polipoli Spring, the only permanent source of water on the southern end of Mt. Haleakala. One of the objects underlying the creation of the reserve is to establish a forest cover on the area adjacent to this spring, for notwithstanding the fact that water is now brought to the district by the Kula Pipe Line, Polipoli must always remain a locally important source of supply. Along with getting trees to grow on land that can better be used for forest than for any other purpose, it is obvious that any measures that will tend to increase the flow of such a spring as Polipoli are seriously to be considered.

History.

Prior to about 25 years ago there was a belt of heavy forest with dense undergrowth in the Kula District between the elevations of 3500 and 5000 feet, that is throughout the section immediately above the corn belt. Gradually this forest was opened up by grazing until now it has practically disappeared save as its former extent can still be traced by dead stubs, small groups of trees in certain steep-sided gulches where they are protected from cattle, and scattered groves of Mamane.

Looking up from below, from the Government road, the remaining dead trees make it appear that there is still a considerable stand. But when one gets into it he finds that the former forest belt is now open country with a heavy ground-cover of grass.

The area formerly covered by the Kula forest is now considered the best grazing land in the district. It has so been used for the past twenty years or more. Up to November 1, 1911, the upper lands of Waiohuli and Keokea, up to the crest of the mountain were under lease to the Cornwell Ranch for grazing. Waiakoa and Alae 3-4, for a time unleased, along with the fee simple lands of Kaonoulu and portions of Alae 1-2 were also so used.

When the time came for re-leasing the Government lands, the administration decided, after careful consideration of the whole matter, that it was best again to lease the strip of grazing land above the corn belt, but that the higher slopes should be reserved. This action was largely based on the facts that the old native forest was so far gone that its replacement through natural reproduction was practically out of the question and that, because of its value as grazing land, this section materially increased the usefulness of the lower portions of the lands.

The proposed Kula Forest Reserve, therefore, consists of the

slopes of the mountain above an elevation of approximately 5000 feet.

The location of the forest reserve boundary was fixed after a full discussion of the relative value of this area for grazing or for forest had been had on the ground with a number of Kula ranch men. The line adopted by the Government as the forest line and mauka boundary of the grazing land was selected as the result of this conference, backed by other information acquired by me from time to time during that and other visits to Kula. The line was run out on the ground by Mr. S. M. Kanakanui of the Government Survey Office, the important points being marked by forest reserve monuments.

The new leases of Waiohuli-Keokea (No. 742) and Waiakoa-Alae 3-4 (No. 743) contain, along with tree planting requirements for the lower, grazing lands, a provision that a fence shall be built and maintained on this forest line. Under the terms of the leases this fence must be built "within one year from November 1, 1911."

Reasons for the Kula Reserve.

The proposed Kula Forest Reserve differs from most of the forest reserves so far created in this Territory, in that it is essentially an area where a forest cover must be established. This naturally must be a matter of time, but if gone about right I am confident that eventually forest can be made to cover a considerable part of this slope of Mt. Haleakala.

Above an elevation of approximately 6000 feet the old native lower-zone forest never did extend, giving place at that level, except for Mamane, to the scrub growth characteristic of the higher elevations of our mountains. Along the lower boundary of the forest reserve some of the trees of the lower forest zone may perhaps in spots be induced to come back—and every reasonable assistance should of course be given them to do so—but for the most part it is now too late.

Higher up, Mamane can be depended on. Indeed, during the past decade there has been a marked increase in Mamane on this slope of Haleakala, all the way from the crest of the mountain down to the proposed forest line, but particularly high up on the slope. Within a short time now the small trees will be large enough so that the groves in which they occur can be seen from a distance. Mamane is a valuable tree. Its spread should be fostered wherever practicable.

Over a considerable part of the proposed Kula Forest Reserve I believe that dependence in afforestation must and should be placed on introduced trees. Experience on Maui, both in Kula and above Makawao, has shown that certain of the Eucalypts are admirably adapted for use up to about 7000 feet, while planting experiments are now in progress which I am sanguine will in the end point the way to other exotic trees of economic value that can be got to grow and in time spread naturally over the mountain.

The establishment of a forest on the upper slopes in Kula must necessarily be a slow matter, but with the land set apart and devoted to this purpose steady gains can be made.

There are two reasons why this slope of Haleakala should be devoted to forestry. First, because although most of this area cannot profitably be used for agriculture, a large part of it can be made to grow economically valuable trees. This in itself is sufficient justification of its reservation, but to it may be added the second reason, the possible influence which a forest cover might exert on the local climate.

At present we have so little exact knowledge about this latter subject that generalizations are most unsafe, but it does appear that if an appreciable influence on precipitation can be effected anywhere by a body of forest, Kula is one of the likely places. If then, incidental to tangible and direct benefits through wood production, this influence can also be brought to bear, it is worth considering. Briefly the facts are as follows:

Kula is unfortunate in the scarcity of its natural supplies of water. Between the battery of small springs at Polipoli and the Waihou Spring on the boundary of the government land of MaKa-wao, on the Haleakala Ranch, 10 miles or more distant, there is, save for the intermittent flow from a tunnel constructed by Mrs. Dora von Tempsky above Erehwon, no living water anywhere in the District. The local water situation as regards domestic supply has, of course, been relieved in the last two years by the construction of the Kula pipe line, but that does not change the lack of local sources of supply. Moreover, from the steepness of the slope it is difficult if not prohibitively expensive to store the storm waters that now run to waste down the larger gulches, not infrequently doing damage along their course. Incidentally, another advantage to be gained by a forest cover on the upper slopes is that thereby the run off after storms would be somewhat held back and the danger of erosion lessened.

As to possible influence of a forest on precipitation, the moisture bearing clouds that bring rain to the Kula District are of two kinds: (1) the trade wind clouds that pour over the Kahikinui Ridge, and (2) and probably more important, the Naulu clouds that, forming out of a clear sky over the island and channel of Kahoolawe, drift in and collect on the Kula side of the Haleakala Ridge from above Ulupalakua over to and beyond a point above Erehwon. Just how heavily laden with moisture these Naulu clouds are is a point on which opinions differ but in general I understand that there is frequently, if not usually, sufficient moisture so that water will condense on a rough woolen coat or on a man's beard. During seasons of continuous drought, however, like 1908 or the present year, the Naulu clouds seem to afford no relief to the lower lands.

The argument put forth in favor of a forest cover in this connection is that were a large enough stand of forest present the

slightly cooler surface thus presented would be sufficient to tip the delicate balance of other natural factors and cause some of the moisture to be precipitated.

Whether or not this would actually happen, experience in Upper Hamakua, Hawaii, has shown that through the drip from condensation on the leaves of trees standing exposed to moisture-bearing fogs very considerable quantities of water can be and in fact are collected in tanks and cisterns. I see no reason why a similar state of things should not obtain in upper Kula. And in view of the need of water I believe this is a phase of the subject that should at least be carefully investigated.

Sufficient returns to justify the initial outlay would in my judgment be got from the wood and timber produced from blocks of forest established in the reserve. Any beneficial influence that the forest might otherwise exert would be an advantage thrown in.

In any planting undertaken in the Kula Forest Reserve, the idea should be kept constantly in mind that in the end natural reproduction is to be depended on for the spread of the trees. The initial planting should be made so that the trees set out would act in the most efficient way as producers and distributors of seed. This, of course, applies to whatever species are used, Eucalypts or trees from the north temperate zone.

The questions of how the initial planting is to be paid for and of just what trees should be used do not need to be considered here. It is enough now if this area is set apart as a forest reserve.

The Polipoli Section.

Any tree planting undertaken on the Kula Forest Reserve should begin at the south end in the section that has for some years been held by the Land Office under the terms of Government Lease No. 542, as the Polipoli Spring Reserve. This area, a portion of the government land of Kamaole, is about a mile square. For the most part it is open land, covered by a heavy growth of grass. There are a few groups of Mamane and some scattering trees of other species.

The Polipoli water sources consist of a battery of six springs, two of which, Polipoli and Wai Kawekane, are within the fenced Polipoli reserve. Under Lease No. 542, the Henry Waterhouse Trust Co., Ltd., as trustees for the Ulupalakua Ranch, hold, rent free, for a term of 20 years, expiring in 1922, five-eighths of the flow from Polipoli Spring. Prior to the construction of the Kula Pipe Line the other three-eighths was conveyed by pipe down the slope to a tank on the government road as a public supply for the people of that locality. Of late this pipe has at times been out of repair. The rest of the water from Polipoli proper, with that from the other springs, goes by pipe to various parts of the Ulupalakua Ranch.

Under the terms of Lease No. 542 the Polipoli Reserve has been

fenced off and more or less efficiently kept free from cattle. Partly as the result of disputes between owners of the neighboring lands there has been a good deal of trespass at Polipoli, which is still going on intermittently. But realizing the value of the water, pretty nearly everybody agrees that the area ought to be reserved and efficiently protected. In this connection it may be said that from now on the fence maintenance clauses in all the leases that have to do with the Kula Forest Reserve boundary ought to be strictly enforced. Provision should be made also for policing the reserve as a whole against trespass.

It goes almost without saying that every effort should be made to safeguard the source and increase the flow of the Polipoli Spring. Getting a forest cover on the slope above the spring will, I believe, help somewhat in this regard.

Fencing the Boundary.

As previously stated the fencing of the makai boundary of the reserve where it adjoins government lands is already provided for. Across the fee simple lands of Kaonoulu and Alae 1-2 the owners of the Cornwell Ranch have agreed to continue the fence on the forest line.

At the north end, the boundary between Waiakoa and Kealahou is for some distance a gulch, impassable except at a few crossings, which runs well up toward the steep rocky upper slopes below the crest of the mountain.

Along the crest there is no fence, so that cattle from the Kahikinui side can and at times do come over, though not as much now as formerly because of paddock fences that have been built on that side of the mountain. The Kahikinui lease has eleven years yet to run. When it expires, if the matter cannot be arranged previously, provision should be made for fencing that will protect all the upper slopes of the mountain.

Around the south end of the ridge fences of the Ulupalakua Ranch connect with the fence about the Polipoli Reserve and keep cattle from drifting along the slope.

Recommendation.

For the reasons above set forth, which may be summarized by saying that the upper slopes of Mt. Haleakala can be made of most benefit to the Territory if gradually got under a forest cover, I do now recommend that the Board of Commissioners of Agriculture and Forestry approve the creation as the Kula Forest Reserve of the area covered by the following technical description of boundary prepared by the Government Survey Office, and that the Governor of the Territory be requested to take the usual steps officially to set apart the tract as a forest reserve in accordance with law.

Following is the description :

KULA FOREST RESERVE.

Including portions of the lands of Kamaole (Polipoli Spring), Keokea, Waiohuli, Alae 1 & 2, Alae 3 & 4, and Waiakoa, in the District of Kula, and portion of Papaanui, in the District of Kula, and portion of Papaanui, in the District of Honouliuli.

ISLAND OF MAUI.

(C. S. F. 2300)

Beginning at the forest reserve monument at the Northeast corner of Grant 517 to J. Sniffen and on the boundary of Keokea and Kamaole, the coördinates of said monument referred to Government Survey Trig. Station "Puu-o-Kali" being 15,027.5 feet South and 16,947.6 feet East, as shown on Government Survey Registered Map No. 2519, and running by true azimuths:—

1. 228° 58' 35" 13414.0 feet along the Waiohuli-Keokea Grazing land to a forest reserve monument at the head of the land of Koheo and on the boundary of Waiohuli and Kaonoulu;
2. 208° 02" 9948.7 feet across the lands of Kaonoulu, Alae 1 & 2, Alae 3 & 4, and Waiakoa to a forest reserve monument at a point called "Kohe" on the boundary of Waiakoa and Kealahou 3 & 4, the coördinates of said monument referred to Government Survey Trig. Station "Puu-o-Kali" being 2553.0 feet North and 31751.1 feet East;
3. 315° 58' 6647.0 feet along the land of Kealahou 3 & 4 to a stone marked by an arrow cut on rocky ridge between two gulches;
4. 301° 43' 2830.0 feet along the land of Kealahou 3 & 4 to a pile of stones at the edge of a rocky gulch;
5. 307° 41' 6365.0 feet along the land of Kealahou 3 & 4 to a pile of stones on the boundary of Papaanui;
6. 67° 56' 7140.0 feet along the land of Papaanui to a pile of stones on top of mountain;
7. 53° 55' 3395.0 feet along the land of Papaanui to a cross cut on the rock over a sort of cave at a place called Kalepeamoa;
8. 61° 40' 12230.0 feet along the land of Papaanui;
9. 68° 03' 20" 1906.8 feet along the land of Papaanui to "Puu Keokea" Trig. Station marked by a 1½ inch galvanized pipe;
10. 329° 03' 30" 3121.8 feet across the land of Papaanui to a forest reserve monument at a place called "Kieiei" on the boundary of Papaanui and Kahikinui;
11. 83° 44' 3570.0 feet along the land of Auwahi in Kahikinui to a forest reserve monument in a cave;
12. 34° 21' 30" 3350.0 feet along the land of Auwahi to a forest reserve monument, said monument being by true azimuth and distance 214° 21' 30" 6990.0 feet from "Puu Ouli" Trig. Station;
13. 116° 45' 3090.0 feet across the land of Kanaio along Grant 4640 to J. H. Raymond to a forest reserve monument on the boundary of Kamaole and Paeahu;
14. 124° 13' 30" 1007.2 feet along the land of Paeahu to a forest reserve monument;
15. 204° 35' 2640.0 feet to a forest reserve monument;
16. 114° 35' 1320.0 feet to a forest reserve monument;
17. 204° 35' 1336.5 feet to a forest reserve monument;

18. 294° 35' 330.0 feet to a forest reserve monument;
 19. 204° 35' 3976.5 feet to the point of beginning.

Areas.

Papaanui, Government land.....	370	Acres
Kamaole (Polipoli Spring), Government land.....	612	"
Waiohuli-Keokea Tract Government land.....	2450	"
Kaonoulu	804	"
Alae 1 & 2.	202	"
Alae 3 & 4, Government land.....	70	"
Waiakoa, Government land.....	1567	"
Total	6075	"

Very respectfully,

RALPH S. HOSMER,
 Superintendent of Forestry.

DIVISION OF FORESTRY.

Honolulu, Sept. 7, 1912.

Board of Commissioners of Agriculture and Forestry, Honolulu,
 T. H.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for the month of August, 1912.

During the first ten days of August I was in Honolulu engaged in the preparation of reports upon, and with details in connection with certain forest reserve projects that came up for final action later in the month.

From August 10 to 24 I was on Kauai making a general inspection of forest conditions on that island and looking into a variety of forest matters. During my stay on Kauai I followed the forest reserve boundary from Waimea around to Hanalei, seeing in some detail many of the forest lands in the several reserves along the way. The remainder of the month I was on Oahu, occupied with work in the office and with one short trip, to Nanakuli and Honouliuli.

New Forest Reserves.

On August 26, a public hearing was held at the Government Nursery to consider the creation of two new forest reserves, respectively on the Island of Molokai and in the Kula District, Maui, and the addition of a small block of land to the existing Waianae-kai Forest Reserve on Oahu. A number of persons appeared in regard to the Molokai Reserve. After a full discussion, the Governor announced that he would sign proclamations creating that and the other two forest reserves.

The areas are as follows:

Name.	Total area Acres	Gov't. land Acres	Per cent.
Molokai	44,674	13,268	30
Kula	6,075	5,069	83
Waianae	396	396	100
Total	51,145	18,733	100

These new reserves increase the total area of all the forest reserves in the Territory to 685,101 acres, of which 454,390 acres, 67 per cent., is government land.

Yearbooks.

In accordance with the usual custom, the Hon. J. K. Kalani-anaole, Delegate to Congress, has again had his quota of the Yearbook of the U. S. Department of Agriculture forwarded to this office for distribution. The books have been sent out to a carefully selected list of persons throughout the Territory. A few yet remain that may be had free, upon application to the mailing clerk, Board of Agriculture and Forestry, Box 207, Honolulu.

Orders for Seedlings.

Notwithstanding the long continued drought which has hindered a good deal of forest planting work, interest in tree planting in Hawaii seems to be decidedly on the gain. Recently there have been received a number of good sized orders for forest tree seedlings for planting this coming autumn and winter. One in particular deserves special mention, that from Waialua Plantation for 500,000 trees. Planting trees in such numbers as this is forest work that counts. The report of the Forest Nurseryman gives the details of this branch of the work of the Division of Forestry.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

NURSERYMAN'S REPORT.

Honolulu, Sept. 1, 1912.

R. S. Hosmer, Esq., Superintendent of Forestry, Honolulu, T. H.

Dear Sir:—I herewith submit a report of the principal work done during the month of August.

NURSERY.

Distribution of Plants.

	In seed boxes	In boxes transplanted	Pot grown	Total
Sold . . . . .	.....	150	188	338
Gratis	1500	2100	2035	5635
	<hr/> 1500	<hr/> 2250	<hr/> 2223	<hr/> 5973

Collections.

Collections on account of plants sold amounted to \$8.40.

Seed Collecting.

The Koa and a number of the Eucalyptus on Tantalus are now in season and the boys have been collecting there during the greater part of the month. The Koa seed is badly infested with the seed borer but I think we may be able to get a number of pounds of good seed.

Plantation Companies and Other Corporations.

Plants delivered:

1,500 transplants in boxes ready to set out

500 pot grown

10,000 seedlings in seed boxes

12,000

Orders received for plants to be delivered during the next six months:

12,000 Ironwood in transplant boxes ready to set out

500,000 Assorted Eucalyptus seedlings

The above orders came from the plantation companies.

Experiment Garden, Makiki.

Owing to the large number of tin cans which we have been receiving gratis from the cannery at Iwilei and which we are using to good advantage for setting of trees, we have found it necessary to erect a shed at Makiki to hold them and we have, with the aid of the men at the Nursery, put up a rough shed for that purpose. We have also made a machine for cutting the ends of the tins, thereby reducing the cost of labor considerably. With the machine one man can cut five tins in the same time that he could cut one with the ordinary can opener.

We are getting a large number of trees ready for the coming Arbor Day.

U. S. Experiment Planting, Nuuanu Valley.

Owing to the dry weather no planting has been done for several months, but we have a number of trees ready at Makiki and will plant them just as soon as the rain comes. The men have been hoeing and keeping the trees clean.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, Sept. 12, 1912.

Hon. W. M. Giffard, President and Executive Officer, and Members of the Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I beg to report on the work of the Division of Animal Industry for the month of August, 1912.

The importation of dogs remains about the same number of animals, that is from 16 to 20—as was found to be present at the end of the first four months, or, in other words, about an equal number is coming in as is going out. Unless, therefore, an unexpectedly large importation should come again, such as might accompany a new regiment of soldiers, it may be concluded that the quarantine station as now established will serve all present requirements.

The fifteen dogs which have been kept in quarantine at Schofield Barracks were released a few days ago, all of them being found sound when last inspected on the 5th inst. The temporary kennels which were built for the accommodation of these dogs were, after four months service, considerably the worse for wear and if future importations of dogs belonging to the various arms of the military service are to be granted the same privileges, that is, are to be quarantined at Schofield Barracks, or on military reservations, it would seem well for this Board to insist on the construction of quarantine quarters of a more permanent nature than those hitherto provided.

From official reports received at this office, as well as from newspaper reports, it appears that rabies is spreading constantly, having now invaded the State of Oregon and caused the promulgation of a muzzling act in Portland, which requires all dogs to be either muzzled or kept in leash if brought into the streets of that city.

By the S. S. *Zealandia* there arrived on the 10th inst. 3 dogs from New Zealand, the same being consigned to the Lanai Ranch. These dogs were accompanied by a certificate signed by the Director of the Division of Live Stock and Heat of the Department of Agriculture, Commerce and Tourists of the Dominion of New Zealand, to the effect that the disease of rabies does not exist in New Zealand and moreover has never been known to exist in that country. While the importer has made no application to this Board for a permit of importation it would seem that all other requirements of the rabies regulation have been complied with, and it is therefore recommended that the three dogs in question, which are detained at the local quarantine station pending the Board's decision, be allowed to proceed to their destination (Lanai) by the first available steamer, that is the "*Mikahala*" on September 17th.

Similarly, three other dogs are expected to arrive from Liverpool, England, within a few days. These dogs are also accompanied by certificates to the effect that rabies has not been known to exist in England for several years and the agents (Messrs. Schaefer & Co.) are anxious that the dogs should be allowed entrance to the Territory upon arrival without quarantine.

This, I believe, can safely be granted if the steamer carrying the dogs has not docked at any infected port since leaving Liverpool, or if such was the case that proper precautions were taken to prevent contact with other dogs while in port.

The swimming tank at the quarantine station has been practically finished, the delay being due to the illness of the contractor, Mr. Oss, whose bid of \$116 was accepted. The tank will undoubtedly add much to the welfare of the confined animals, many of which are feeling the continued hot weather badly, and it is hoped, will be able to find much relief by means of frequent immersions in the tank.

Tuberculin Testing.

As will be seen from the appended report of the Assistant Territorial Veterinarian, the tuberculin testing of dairy cattle on this island may be considered finished for the present time, or at least cannot be resumed until sufficient rain has fallen to allow of the handling of those range animals which have not yet been tested.

It might, therefore, be well to consider now whether this work is to be extended to the other islands, as recommended in previous reports.

From letters received from the Deputy Territorial Veterinarians on both Hawaii and Maui it would seem that there is a certain demand for the extension of this work, if the coöperation of this Board can be secured, or to put it plainly, if the work of testing can be undertaken by this Board. To do this properly would, in my opinion, require that either myself or my assistant

take actual charge of the work. It would, however, be necessary that the various counties where this is to be done should first pass a milk ordinance requiring the tuberculin testing of all dairy cattle from which milk is drawn for human consumption. It should also be ascertained what financial or other support can be expected from the counties enacting such an ordinance, especially as an automobile will be required for the use of the inspector and his assistant while the work is going on. The milk ordinance in effect in this county might, with a few alterations, be used as a basis for similar regulations elsewhere.

Quarantine Stations on Other Islands.

The selection of a site for a quarantine station on Hawaii was accomplished by a trip to Hilo during the beginning of August. The site is located on what is known as the Shipman slaughterhouse pasture, near the entrance to the Waiakea Mill. The plans are all prepared and ready for advertising as soon as the new manager of the Waiakea Sugar Company takes charge and approves of the arrangement.

In regard to the Maui station, there are several locations offered to the Board, but a visit by myself to decide on which one to select will undoubtedly be advisable. The correspondence of Drs. Elliot and Fitzgerald, both in regard to the respective stations as well as to tuberculosis testing, is herewith appended.

I also append a copy of a report on the live stock industry of the Territory prepared at the request of Governor Frear.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

ASSISTANT VETERINARIAN'S REPORT.

Honolulu, September 1, 1912.

Dr. Victor A Norgaard,
Chief of Division of Animal Industry,
Board of Agriculture and Forestry,
Honolulu, T. H.

Sir:—I beg to submit herewith a report of the work for the month of August:

Tuberculosis Control.

The third general test of the dairy herds of the City and County of Honolulu is practically finished. The testing during the past month has been confined to two dairies, and is as follows:—

August 1-3	T.	P.	C.
P. M. Pond	10	10	0
John Souza	2	2	0

A tabulated list of the various dairies visited and number of animals tested is given below, and from the figures it will be seen that a total of 5265 animals were subjected to the test, of which number 5067 passed and 198 condemned, giving a percentage of 3.76 of tuberculosis animals on the Island of Oahu. This is a gratifying improvement over last year's test, which showed a percentage of 5.36 of tuberculosis animals:

	T.	P.	C.
1. Wm. Gomes	10	9	1
2. J. H. Cummings.....	5	5	0
3. D. P. R. Isenberg.....	337	312	25
4. Marshall & Azevedo.....	28	26	2
5. P. M. Pond.....	37	36	1
6. M. Gomes	28	28	0
7. H. B. Brown.....	13	13	0
8. S. J. Grace.....	5	5	0
9. Capt. Hartman	3	3	0
10. J. E. Faria.....	20	20	0
11. R. Compos	12	12	0
12. Frank Gouveira	24	24	0
13. J. Quintal	2	2	0
14. J. M. Whitney.....	10	10	0
15. T. F. Farm.....	45	42	3
16. Omai Tatsulichi	10	10	0
17. E. C. Kraus.....	1	1	0
18. K. Inouye	8	8	0
19. W. P. Alexander.....	5	5	0
20. I. Nagaki	15	15	0
21. J. H. Cummings.....	4	4	0
22. Mrs. C. M. White.....	10	9	1
23. Frank Medeiros	12	12	0
24. P. Miyakawa	13	13	0
25. J. Allencastro	7	7	0
26. K. Yamashita	7	6	1
27. S. Hiarata	14	14	0
28. C. K. Quinn.....	6	6	0
29. Chas. Frazer	1	1	0
30. College of Hawaii.....	15	15	0
31. H. E. Cooper.....	15	15	0
32. Frank Andrade	81	80	1
33. Kawaiahao Seminary	15	15	0
34. Mrs. Mary Quintal.....	8	8	0
35. S. Tsumoto	9	9	0
36. M. Kawamura	6	6	0
37. Mrs. W. W. Hall.....	1	1	0
38. G. L. P. Robinson.....	5	5	0
39. Frank Valph	6	6	0
40. Chas. Bellina	138	112	26
41. S. de Nobriga.....	13	13	0
42. Oahu College	12	12	0
43. Manuel Abreau	3	3	0
44. John Rezants	13	13	0
45. C. J. Day.....	5	5	0
46. Geo. Wond	18	18	0
47. Antone Pires	8	8	0
48. Geo. Holt	37	35	2
49. Kamehameha Schools	44	42	2
50. W. E. Miles.....	17	16	1

	T.	P.	C.
51. Frank Correa	13	12	1
52. Mrs. Mary Riedell.....	10	9	1
53. Victornia Souza	35	33	2
54. Alexander Young Dairy.....	46	46	0
55. Desidero Tello	2	2	0
56. John P. Mendonca.....	10	10	0
57. L. C. Fernandez.....	8	8	0
58. J. G. Silva.....	4	4	0
59. A. Wilder	2	1	1
60. Richard Kapena	2	1	1
61. A. Tavash	3	3	0
62. Mrs. E. Johnson.....	2	2	0
63. S. M. Damon.....	148	143	5
64. Gait & Carter.....	13	13	0
65. M. Ota	1	1	0
66. Chas. Bellina	28	28	0
67. Chas. Lucas	90	80	10
68. S. M. Damon.....	182	178	4
69. P. M. Pond.....	327	317	10
70. O. R. & L. Co.....	1403	1390	13
71. Y. Ogawa	4	4	0
72. J. A. Templeton.....	37	35	2
73. Laie Plantation	16	15	1
74. Industrial School	48	48	0
75. F. S. Lyman.....	17	17	0
76. E. K. Elleworth.....	1	1	0
77. J. Coonrad	3	3	0
78. Waianae Ran h	292	186	6
79. P. Isenberg	129	116	13
80. Tom Quinn	5	5	0
81. S. Boyama	5	5	0
82. Y. Nakamura	5	5	0
83. J. Schwank	5	5	0
84. F. Johnson	9	8	1
85. E. C. Smith.....	9	8	1
86. I. Morioko	22	19	1
87. R. McKeague	4	4	0
88. I. Moniz	2	2	0
89. A. Reis	2	2	0
90. S. Tado	9	9	0
91. K. Shimidsu	2	2	0
92. C. E. Eckland.....	2	2	0
93. T. Fugita	2	2	0
94. N. Kimoto	2	2	0
95. F. de Mello.....	8	7	1
96. S. M. McKeever.....	2	2	0
97. R. T. McGettigan.....	2	2	0
98. H. Focke	8	4	4
99. O. R. & L. Co.....	597	593	4
100. Kaneohe Ranch	102	94	8
101. Waimanalo Plantation	28	28	0
102. Kamehameha Schools	1	1	0
103. Joe Fernandez	4	4	0
104. M. Riedell	1	1	0
105. M. Kawamura	3	3	0
106. S. J. Allencastro.....	1	1	0
107. J. W. McGuire.....	11	11	0
108. J. Gouveira	19	19	0
109. M. Gomes	15	15	0
110. J. P. Mendonca.....	1	1	0

	T.	P.
111. M. Gomes	6	6
112. Paul Isenberg	2	2
113. Paul Isenberg	182	163
114. Paul Isenberg	138	120
115. P. M. Pond	10	10
116. John Souza	2	2
	<hr/>	<hr/>
	5265	5067

Inspection Service.

During the past month seven trips were taken to Sc Barracks for the purpose of inspecting the dogs quar there. Everything was found to be in as good order as co expected from the temporary nature of the quarantine p

On the first trip, August 2, Captain Apple's dog was r from quarantine, the required one hundred and twenty day ing expired on that date. The dog was delivered to the in excellent physical condition.

Port Inspection.

The following vessels arrived at the port of Honolulu live stock:

- August 1—S. S. Korea, San Francisco; 1 cat, 4 cts. p
- August 5—S. S. Ventura, San Francisco, 1 ct. poulti
- August 6—S. S. Wilhelmina, San Francisco, 5 cts. p
- August 13—S. S. Makura, Sydney, 1 dog, Duke Johr
- August 13—S. S. Chiyo Maru, Orient, 1 ct. chix.
- August 14—S. S. Honolulan, San Francisco, 18 H
heifers, 1 Holstein calf, 4 brood mares, 6
rams, Paul Isenberg; 2 Holstein bulls, Haw
Co.; 1 dog, B. C. Wilson; 9 cts. poultry.
- August 16—S. S. Siberia, San Francisco, 3 cts. Psu
rocks.
- August 19—S. S. Sierra, San Francisco, 10 cts. poultry
- August 28—S. S. Lurline, San Francisco, 11 cts. pou
dog (Mr. Fitzgerald of Maui), dog quar
in Honolulu for the required 120 days.
- August 29—S. S. Mongolia, San Francisco, 3 cts. pot

Respectfully submitted.

LEONARD N. CASE,
Assistant Territorial Veterina

DIVISION OF ENTOMOLOGY.

Honolulu, August 31, 1912.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of August as follows:

During the month there arrived 36 vessels, of which 20 carried vegetable matter and one vessel sand. The usual careful inspection was made with the following results:

<i>Disposal with principal causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	1,040	17,200
Fumigated or otherwise treated.....	6	36
Burned	22	55
Total inspected	1,068	17,291

Rice Shipments.

Twenty-two thousand eight hundred and nine bags arrived from Japan during the month and all was accompanied with certificates of fumigation. After thorough inspection the shipments were passed as free from pests. In this connection I beg to report that during last season we found some bean shipments infested with the rice moth and thought at that time that the infestation was caused by the shipment being in contact with the infested rice shipments. However, this season we again found a small shipment of beans infested, and as all rice shipments had been fumigated and found free from pests, we now have requested the fumigation of all bean shipments under government supervision before taken for shipment at Kobe or other Japanese ports. The Japanese Merchants' Association has taken the matter up with their government, and I don't anticipate any further trouble.

Pests Intercepted.

Thirty packages of fruit and 25 packages of vegetables were confiscated from passengers and immigrants during the month. One package of seeds from Sydney was found infested with weevils (*Calandria linearis*). One package of seeds (*Balanocarpus maximus*) were so badly infested with *Scolytid* beetles that hardly a single seed was free from the pest; the package was fumigated for 24 hours and then all was destroyed by burning. One Hydrangea from the mainland was badly infested with *Bryobia* sp., a common red spider, and was thoroughly fumigated before delivery. The common house ant (*Monomorium pharaonis*) was found in the baggage of an immigrant from Yokohama.

Beneficial Insects.

We distributed 18 lots of Japanese beetle fungus to various applicants. This pest is not as bad as last season, although some sections seem to favor the increase of the beetle more than others.

Hilo Inspection.

Brother Matthias Newell reports the arrival of six vessels at Hilo, of which three brought vegetable matter, consisting of 74 lots and 1,116 packages, which were passed as free from pests.

Inter-Island Inspection.

During the month of August, 60 steamers were attended to, and the following shipments were passed:

56 cases plants.
473 bags taro.
11 bags cocoanuts.
7 packages fruit.
2 cases sugar cane.

Total 549 packages inspected and passed.

The following packages were refused shipment:

42 packages of fruit.
3 packages of vegetables.
8 packages of plants infested and carrying soil.

Total 53 packages inspected and refused shipment.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

THE FRUIT FLY CAMPAIGN.

Report of Committee on Entomology.

Honolulu, September 12, 1912.

To the Commissioners of the Board of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—The Executive Officer of the Board has called the attention of your Committee on Entomology to the following facts, viz.:

1st. The "Agricultural Bill" as passed by the last Congress provides the sum of \$35,000 for the "Investigation of the Mediterranean fruit fly in the United States, its territories and possessions, said sum being immediately available for the purpose named."

2nd. As a result of said appropriation, the Secretary of Agriculture has authorized an investigation of the Mediterranean fruit fly in this Territory, together with such expenditures as may be necessary in connection therewith, the said investigation to be conducted under the supervision of the Bureau of Entomology, Washington, D. C.

3rd. Dr. E. A. Back, of the U. S. Department of Agriculture, arrived in Honolulu on the 29th ultimo bearing a commission from the Secretary of Agriculture and under instructions from the Chief of the Bureau of Entomology, his object being to direct the expenditure of the federal appropriation referred to on such lines as may be not only of benefit to Honolulu and adjacent territory, but also as a means of protection to the mainland.

4th. Doctor Back has instructions from the chief of his department to avail himself of the coöperation of the Territorial Board of Agriculture in his proposed line of investigation and control, and both he and Mr. Marlatt, the assistant chief of the Bureau of Entomology, have asked for such coöperation and assistance as your Board may be able to offer.

5th. As a result of the federal appropriation, the California State Horticultural Commissioner has notified your executive officer that financial assistance will no longer be required by the Territory from the State of California, and proposed to withdraw such assistance as of September 1, 1912.

In view of the facts above mentioned, your committee makes the following recommendations, to wit:

(1) That the direction of the fruit fly control by artificial means, as already organized and operated by the Territorial Board of Agriculture and Forestry, be assigned to Dr. E. A. Back, as its special agent, and that the president and executive officer be authorized to commission Dr. Back as said special agent for the purpose named, the said assignment and commission to be dated as of September 15, 1912.

(2) That the president and executive officer be authorized to allow the balance of the Territorial appropriation for combating the fruit fly by artificial means to be expended under and by direction of Dr. E. A. Back, as special agent in coöperation with the Territorial Board of Agriculture and Forestry, or its executive officer.

(3) That the use of a portion of the premises, now partly occupied by the offices and laboratories of the Board, be tendered to Dr. Back for such purpose as he may deem necessary in connection with the work to which he has been assigned by the U. S. Bureau of Entomology.

(4) That your executive officer be authorized to officially acquiesce in the proposal of the California State Horticultural Com-

missioner that financial assistance be withdrawn as of September 1, 1912.

Respectfully submitted,

W. M. GIFFARD, Chairman;
ALBERT WATERHOUSE,
J. M. DOWSETT,
Committee on Entomology,
Board of Agriculture and Forestry, T. H.

Letter from President.

Honolulu, September 9, 1912.

To the Commissioners of the Board of Agriculture and Forestry,
Honolulu.

Gentlemen:—I have to report that the recent United States Congress enacted a Federal law to regulate the importation into any State or Territory of any nursery stock and other plant products, to permit and regulate the movement of fruits, plants and vegetables therefrom and to establish and maintain quarantine districts for plant diseases and insect pests.

I am informed that this new Federal quarantine law will permit the continuance of the present exportation of bananas and pines to mainland ports, providing that these fruits undergo the customary inspection before shipment and are found to be free from attack of insect pests. As regards other fruits and vegetables which at present are not allowed export to coast ports, it has been intimated by the representatives of the U. S. Department of Agriculture that if after careful investigation certain varieties of these are demonstrated to be free from attack or infestation, the quarantine on such will be lifted.

I am personally informed by Mr. C. L. Marlatt, the assistant chief of the Bureau of Entomology and chairman of the Federal Horticultural Board, that he has recommended to the Secretary of Agriculture that the inspection of bananas and pines intended for export to Pacific Coast ports be placed in charge of Dr. E. A. Back as soon as the quarantine has been officially promulgated. The promulgation will be in effect on or before September 15, and in the meantime will be continued as at present by representatives of the California State Horticultural Board and of the Marketing Division of the Territorial Bureau of Immigration, Labor and Statistics. After the above date the aforesaid Territorial and California State officials will no longer, as such, attend to, or assist in, the inspection of exportations of fruits and vegetables to the mainland.

I am further informed by Mr. Marlatt, as chairman of the Federal Horticultural Board, that he will recommend to the Sec-

retary of Agriculture the apointment of the Territorial Superintendent of Entomology and his assistants as deputy quarantine plant inspectors under the new law in order that the duties of Territorial and Federal inspection of imported nursery stock, fruits, etc., may be combined, thereby preventing duplication and overlapping of government work.

Respectfully submitted,

W. M. GIFFARD,
President and Executive Officer,
Board of Agriculture and Forestry, T. H.

FORESTRY AS A PROFESSION.

The increasing demand for the practice of Forestry throughout the United States on both public and private lands is the result of the rapid depletion of our forests. Changes in methods of lumbering, better forest fire protection, and the reforestation of denuded areas are urgently needed, if there is to be a timber supply in the future, and if the sources of the waters now used for domestic purposes, power and irrigation are to be protected.

No profession offers greater opportunities for individual success through public service than Forestry. Yet success in this work can be won only by conscientious and unstinted devotion. The discomforts due to weather or isolation in the field test unfailingly the forester's capacity for success.

Forestry should not be selected as a profession except by those with enthusiasm for the work and with sound health. No man can expect to prepare himself for Forestry unless he is ready for the hard study which masters detail and for the rough life of the woods. A thoroughly trained forester must have complete detailed knowledge of his subject and abundant drill in its methods.
—Colorado College Publication.

VOL. IX.

OCTOBER, 1912

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poincianas, Albizzia, etc. The price of the seed varies from 10 to 50 cents per pound. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Hoag, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207 HONOLULU, HAWAII.**

EDW. M. EHRENORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

OCTOBER, 1912.

No. 10.

An article on "Flowers of the Papaya" in the August number of the Forester should have been credited to the Agricultural News (West Indies), as it was a translation specially prepared for that paper.

Tropical Life (London) commends to all interested in the cane sugar industry a book called "The World's Sugar Industry—Past and Present," by H. C. Prinsen Geerlig. It contains 400 pages including index, and is published by Norman Rodger, Altrincham, Manchester, price 12s. net or 14s. post free.

Dr. Norgaard's reports in this issue deserve wide publicity, particularly the section devoted to human and bovine tuberculosis. There is no subject of more vital importance to the human race at the present day. The passage of the milk ordinance by the Honolulu supervisors, prohibiting the distribution of milk from cows uncertified as free from taint of tuberculosis, marked an era in the fight against the great white plague in Hawaii. It is not to the credit of the other counties of the Territory, or the legislature, that similar measures have not been provided to cover the rest of the islands. Territorial action is necessary to back up any county measure of this kind, by way of providing for the expenses of administering the test to cattle. With regard to Oahu, the expense was less than it would be on the other islands, as the departmental experts were more available here and travel a more simple problem, so that a moderate amount of assistance from the municipal treasury enabled the division of animal industry to take up the work of eradicating tuberculosis from the dairy herds of this island—a work which, happily, has been continued until the Territorial veterinarian is able to report it practically completed.

"Official Ayreshire Record No. 14" comes from C. M. Winslow, secretary of the Ayreshire Breeders' Association, Brandon, Vermont. There are eleven cows in the two-year-old form and the one standing highest is White Lilly of South Farm, John Sherwin, owner, her record being 12,022 lbs. milk, 503.88 lbs. fat, 588 lbs. butter and 4.19% fat. The lowest of the eleven in this form is Howie's Flora Macdonald, with 6320 lbs. milk, 271.55

lbs. fat, 317 lbs. butter and 4.3% fat. Of five in the three-year-old form, Langdyke Sally 2nd, owned by Geo. H. McFadden, is second, with 12,925 lbs. milk, 457.14 lbs. fat, 533 lbs. butter and 3.54% fat. In the four-year-old form there are eight cows, the leader being Mabel of Sand Hill, owned by S. S. Karr & Son, with 13,362 lbs. milk, 492.42 lbs. fat, 575 lbs. butter and 3.69% fat. The mature form contains six names, the best being College Maud, Kansas Agricultural College, owner, with 13,727 lbs. milk, 533.29 lbs. fat, 622 lbs. butter and 3.88% fat. These are the averages: Two-year-old form, 8717 lbs. milk, 353.06 lbs. fat, 412 lbs. butter and 4.05% fat; three-year-old form, 10,079 lbs. milk, 381.26 lbs. fat, 445 lbs. butter and 3.78% fat; four-year-old form, 10,560 lbs. milk, 424.10 lbs. fat, 495 lbs. butter and 4.02% fat; mature form, 10,977 lbs. milk, 420.62 lbs. fat, 491 lbs. butter and 3.83% fat; the whole, cows and heifers, 9888 lbs. milk, 390.22 lbs. fat, 455 lbs. butter and 3.95% fat. The leaflet says: "We are pleased to find that our claim that there are many great milkers in many of the Ayreshire herds is more and more proving true, as new herds are submitted to advanced registry tests. We believe that the Ayreshire breed will show a larger percent of profitable dairy cows than any of the other dairy breeds, and will show a higher average production, at less cost for food consumed."

The following cheerful statement of the rubber situation is from Tropical Life for September:

"The position disclosed by Hecht's Annual Statistics is a most satisfactory one. For the twelve months ended June 30, 1912, the world's production of rubber is given as 93,669 tons, as compared with 79,302 tons in the previous year. The total consumption, on the other hand, is returned at 99,564 tons, as against 74,082, an increase of 25,482 tons. The world's stocks of rubber on July 1 are put at 10,181 tons, as against 12,563 tons on the same date in 1911. The considerable expansion in consumption for 1911-12 is attributed largely to the lower level of prices prevailing during the year. This is, of course, a very healthy state of things, and people interested in rubber planting can hardly wish for anything more beneficial in the long run than the maintenance of the present steady prices for the raw material. With rubber at or below 5s. per lb., such an expansion of demand may be looked for as will completely absorb all increased supplies, and establish the planting industry upon a thoroughly sound basis, while enabling well-managed estates to pay quite remarkable dividends. It is interesting to note that (according to figures given by Messrs. Gow, Wilson and Stanton) for the first seven months of the current year the average price of plantation rubber is a fraction over 4s. 11d. per lb. compared with just over 5s. 3d. per lb. for the same period last year, that is to say, only 4d. per lb. less. This, in face of the increased yields, is good."

TERMITES AND WOOD PRESERVING.

(From Tropical Life for September.)

The depredations of Termites and the means of combating them constitute an ever-present problem to planters in the tropical zone; one also which occupies a great deal of the attention of the scientists whose lifework is the study of tropical conditions in agriculture and hygiene. The most interesting contribution to our knowledge on this important subject which has appeared for some time is an article in the July issue of the Agricultural Journal of India by Mr. T. Bainbrigge Fletcher, R. N., F. E. S., F. Z. S., Entomologist to the Government of Madras.

Mr. Fletcher premises his article by taking exception to the popular term "White Ant" in speaking of Termites, for, as he says, the "White Ant" is not an ant at all, and not necessarily white. He then proceeds to show that in the entomological sense Termites belong to quite a different order to true ants, and have very little in common therewith, except in their social habits and caste system. The steps by which knowledge is gained of the differentiation of the very large number of species of this insect, their geographical location, and peculiar habits and activities may be of little interest to the practical planter; but the summarized results of such patient investigation are invaluable in assisting him to safeguard his property, whether it be growing crops or wooden structures of any description that are exposed to attack.

Perhaps the most remarkable information in Mr. Fletcher's interesting article is that relating to the extraordinary reproductive power of Termites, of which the following may be quoted:

"A female of *Termes* Sp. taken from a mound at Toshangabad and placed under as natural conditions as possible, was found to have laid 359 eggs in fifteen minutes, a rate of oviposition which works out roughly at 34,000 per day."

Whilst the longevity of the female is quite unknown, it is suggested as being probably not less than five years, and possibly extending to more than double that time. Considering these points, it is unquestionable that, notwithstanding the heavy depletion of the ranks by natural enemies, the rate of increase is such as to create a serious menace in cultivated or commercial and shipping areas unless adequate means of protection are adopted. The destructive activity of the species *T. gestroi* on the rubber estates of the Malay Peninsula is a striking example of this.

Mr. Fletcher's article is accompanied by a fine colored plate illustrating a full-grown queen and workers at different stages.

The safeguarding of growing crops from Termite attacks is, of course, a wide subject in itself, and is being exhaustively dealt with in various parts of the world, according to the special

local conditions. However, it is with the protection of buildings and the preservation of woodwork generally that we are here generally concerned; and a few points on the efficient and economical treatment of timber may be worth bringing forward. The efficient preservation of woodwork is necessarily of more pressing importance in Termite infested countries than in the temperate zones where timber is for the most part only subject to the slower processes of bacteriological decay and not exposed to the attacks of such voracious insects, the destructive powers of which are startling in their rapidity.

The basis of all processes of preservation is the impregnation of the wood fibres with some antiseptic material toxic to living organisms. The means to accomplish this end are various, but may be broadly classified under three headings: (1) The pressure or combined vacuum and pressure method; (2) the open tank method; (3) the brush method.

For the practical planter the first method is out of the question on the point of the cost of the special plant necessary for transportation of the timber to some large centre where such a plant may exist.

The open tank, or immersion method, however, calls for some detailed consideration, as the only equipment absolutely necessary is any available watertight receptacle of sufficient length to take the timbers to be treated. Where time is no object the immersion of the timber in a cold preservative solution for a period of anything up to three or four days will ensure sufficient impregnation. Given, however, facilities for heating the solution, the treatment with any preservative can be greatly accelerated. Where such facilities exist, however, the quickest and most effective results can be obtained by immersing the timber, heating the solution up, and maintaining it at a temperature of 180° F. to 200° F. for half the total time for which the timber is to be immersed. The solution should then be allowed to cool for the remainder of the time before the timber is to be removed. The underlying principle of this operation is that the preliminary heating of the solution has the effect of expelling the air from the timber and expanding the wood cells. As the cooling proceeds a partial vacuum is produced, so that the preservative solution fills the cellular spaces from which the air has been displaced. The manufacturers of the well-known Atlas "A" Wood Preservative have carried out tests with railway sleepers, from which it has been determined that timber immersed for twelve hours in a solution heated for six hours and allowed to cool for the remainder of the time will absorb a greater percentage by weight of the preservative than similar timber immersed for twenty-four hours heated continuously for the whole period.

Under no circumstances can such thorough impregnation be obtained by the brush method as by immersion; but in many instances where sundry small quantities of timber have to be

dealt with at irregular intervals, painting the surfaces with a reliable, well-proved preservative material will ensure, at a nominal cost, sufficient prolongation of life and immunity from Termites to meet the requirements in view. A good alternative to brushing the preservative over the surfaces when a quantity of light timber is to be dealt with is to apply the solution by means of sprayers or rose watering cans. This can be effectively accomplished with the minimum wastage by laying, say, six planks close together side by side as a "floor." Spray them, turn them over, and spray the other side; lay a second "floor" of six planks directly on top, spray them, turn over, and spray the other side; lay the third "floor," and so on until a convenient height is reached. The timber should be left close stacked in the shade in this way for three to six days to allow the solution in contact to penetrate before opening out to dry. Whilst, of course, this is a quick and handy method for dealing with a quantity of anything up to 1½ in. planking, for heavier timbers open tank immersion is the most efficient method to secure the full benefit of any preservative material that may be used.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, Oct. 7, 1912.

Hon. W. M. Giffard, President and Executive Officer, and Members of the Board of Agriculture and Forestry, Honolulu,
T. H.

Gentlemen:—I have the honor to submit herewith my report as Territorial veterinarian for the month of September, together with such reports, communications and letters from assistant and deputy Territorial veterinarians and others pertaining to the work of the Division of Animal Industry. In order to facilitate action and when possible find disposition of plans for future work and recommendations pertaining to the service, it has struck me that it might be well to deal with each subject on a separate sheet or sheets, thereby obviating the necessity of keeping more than the unfinished part of the report on hand and allowing of the immediate filing of accepted or approved parts. If this plan meets with the approval of the Board, it will be adhered to in the future.

This report deals with the following subjects:

1. Human and Bovine Tuberculosis.
2. Quarantine Stations.
3. Regulations for Quarantine Station.
4. Letters and correspondence.
5. Island Horses for the U. S. Cavalry.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

HUMAN AND BOVINE TUBERCULOSIS.

Four years ago I had the honor to represent this Board as a delegate to the Ninth International Tuberculosis Congress, held at Washington, D. C.

As a result thereof I do not hesitate to say that the City and County of Honolulu is today practically free from bovine tuberculosis, and that the milk supply of Honolulu has been improved a hundred fold, and is today on a par with the best that is to be found anywhere. Thereby is not meant that it is perfect, far from it, as will be shown, but what in most places is considered an insurmountable obstacle, something to avoid or shirk or circumvent, that is, the eradication of tuberculosis from the dairy herds, has been accomplished in *one* of the counties of the Territory, and has demonstrated that the same can be done in the entire group.

The principal reason why I am taking this subject up at some length in this report is that two of my deputies, on Hawaii and Maui, are both of the opinion that tuberculosis has recently begun to spread at a much increased rate among the dairy herds in their respective districts, and further, that I have every reason to believe that had the work of eradication been delayed or deferred even one year longer here, we should have found conditions which it would have been impossible to tackle without extraordinary means and measures.

There have been times during the past four years when I have been in doubt as to the advisability or the justice of the policy adhered to, that is, the absolute and uncompromising eradication of the disease, the toleration not even of a single reacting animal on premises where milk is produced for human consumption, but I am happy to say that, as the reports on similar work done in other States, Territories or foreign countries are received, it has become more and more certain that under conditions like those which obtain here there can be no procrastination, no dilatory methods—that if we were to conquer the disease here, it could be only by way of the slaughter house and not by any “Bang,” “Ostertag” or “Birmingham” or any other method of eradication.

The preliminary reports of the Tenth International Tuberculosis Congress, held at Rome this summer, have just come to hand.

As in the previous meeting, the most important question was of human and bovine tuberculosis in their relation to each other. Only Prof. Koch was not there any longer to defend his ultra-radical views on the subject and more definite conclusions were agreed on. Every civilized country in the world was represented, there being more than 3,000 attendants. One of the most interesting papers was by Prof. Calmette, who, among many other things, mentioned (1) that judging from their appearance under the microscope the human and the bovine type of the tubercle bacillus cannot be definitely differentiated; (2) nor does culture methods distinguish them absolutely from each other; but (3) by

inoculation into various kinds of animals and especially into cattle proves more definitely which is which; (4) that the bovine bacillus is far more virulent or fatal to all mammals than the human form of the bacillus, except to the monkey, which is equally susceptible to both types; (5) that cattle cannot be infected, except locally, by inoculation with even very large doses of the human type; (6) that the bovine type, after sojourn for years in a human being, adapts itself to the appearance of the human type; (7) that in children who die from generalized tuberculosis, between the ages of 0 to 5 years, not less than 26.5 per cent show the presence of tubercle bacilli of the bovine type; (8) that between the ages of 5 to 16 years the same percentage is 25; (9) that above this age the percentage falls rapidly, as low as to 1.5 per cent, but whether this is due to transformation from the bovine to the human type, or due to direct infection from human being to human being through cohabitation cannot often be determined; (10) that it is an undeniable fact that below 16 years nearly 75 per cent of all children dying from tuberculosis show the presence only of the human type and above that age the percentage of fatal cases due to the human bacillus is 98.36. From which it is clear that for the suppression of human tuberculosis we must first prevent its transmission from one human being to another, but at the same time prevent the infection of children with the highly virulent bovine bacillus from the milk of tuberculous cattle.

Prof. Sims Woodhead of the Royal Tuberculosis Commission of England showed conclusively that about 20 per cent of tuberculosis in children was due to infection with the bovine bacillus; and Dr. Nathan Raw of Liverpool after confirming most of the above statements estimated that in Great Britain 15 per cent of all children who die from tuberculosis under the age of 12 years become infected with the bovine bacillus from milk. He proved by statistics that in countries where milk is boiled the amount of surgical tuberculosis in children (scrofulosis) is smaller, and he stated that with the vigorous inspection of dairy cattle the amount of surgical tuberculosis in children in Liverpool during the last ten years has, in his own hospital experience, been reduced by about 35 per cent. When we consider that this "vigorous inspection of dairy cattle in Liverpool" consists in the weeding out of "lungers," by physical examination, not by the tuberculine test, there is reason to believe that the percentage could be largely increased if our method were adopted.

However, the Italian Tuberculosis Congress clearly demonstrated, that the danger of bovine infection is now being widely recognized, the only difference of opinion now being as to the amount of such infection, and there can be little doubt that many countries will shortly adopt vigorous measures for its suppression.

In this connection I would mention the Congress of the Royal Sanitary Institute of Great Britain held at York, England, during the beginning of August this year. At this meeting Prof. Dewar

of the University of Edinburgh made an address on the subject of the tuberculous cow and what to do with it, from which I shall quote a few sentences merely to illustrate that what they are beginning to think about in England has been not alone thought about but carried into effect in this community, at least.

Prof. Dewar starts by discussing the vastly improved conditions of animal life and the prevention of animal diseases during recent years, but recalls that these, though very desirable and beneficent in themselves, are nevertheless merely the means to an end. It is in the relation which these questions bear to the improvement of the health of the community and in their preservation of human life that they mainly derive their importance. The prevalence of tuberculosis among the herds in Great Britain is admitted and while the dangers arising from the use of meat and milk from tuberculous animals is acknowledged to be less than was at one time believed, few, if any, will dispute their existence "and in the case of children and delicate or weakly individuals using raw milk the risk is a terribly real one."

Regarding the inaction of the Government in connection therewith he says: "For more than twenty years now (since Aug. 12, 1889,) the supervision of the health of the live stock of the farm has been committed to the care of a special Government Department and although that department has looked quietly on while tuberculosis was killing not only its thousands, but its tens of thousands annually without so much as moving a finger to prevent the spread of the disease, that is no reason why the department should not begin to move at last and do something by way of honest endeavor for the protection and improvement of the health of the live stock of the country. Perhaps our profession is not altogether guiltless in that it has not done more to educate the public regarding the terribly serious nature and the extent of the disease. We ought to insist, in season and out of season, that something should be done, that some attempt should be made to arrest the progress of this terrible scourge."

That is what the Division of Animal Industry has done for five years past and that is why we stand today where we do, thanks to the unflinching approval and backing of the board.

Prof. Dewar goes on to say that on June 14th this year the Scottish Chamber of Agriculture held a conference at Perth, at which a resolution "was stated to have been unanimously passed," demanding Government compensation for the tuberculous dairy cow, i. e., that instead of merely ordering the cow out of the byre, she should be condemned to be slaughtered, and compensation paid for her. Whether this "demand" bore any fruits is not known but the fact remains that the idea was a good one, as has been demonstrated here. To leave a tuberculous animal alive is simply to leave a center of infection, as isolation or segregation is an impossibility except in a government quarantine station.

That we succeeded in exterminating nearly one thousand tuber-

culous animals without paying any compensation was due in a great measure to the education of the dairy men up to the point where they realized that the sooner they cleaned up their herds, the smaller the loss would be. Besides this we were fortunate enough to find in the Revised Statutes an old law which makes it a misdemeanor to sell or otherwise dispose of an animal known to be affected with a disease transmissible to man. As all reacting animals are branded immediately with an official registered brand, known to everybody, it is not easy to dispose of or even keep on the premises a tuberculous animal.

Prof. Dewar further states that tuberculosis in cattle, owing to its great prevalence, cannot be dealt with like other infectious diseases. It would not only upset the dairy industry, but the live stock industry and other collateral industries in interfering seriously with the country's food supply.

The same was claimed here and a milk famine was predicted when suddenly more than twenty per cent of the milch cows in the district were declared tuberculous. Pasteurization, however, came to the rescue and the milk famine vanished. That proved one of the greatest blessings for the general health of this community, as the necessity for pasteurization resulted in a reorganization of the Dairymen's Association and the installation of a large modern electric milk purifying plant, which proved so absolutely satisfactory that even after all the tuberculous cows had been slaughtered, its use was continued, and at least 75 per cent of the milk consumed in Honolulu today is passed through it and reaches the consumer with less than 1000 bacteria per c. c.

In this connection it is worth mentioning that the Chief of the Federal Bureau of Animal Industry sounds an earnest warning against the use of un-Pasteurized milk, the same being based upon the fact that it has been definitely proven that the bacillus of infectious abortion is frequently found in commercial milk originating on farms where this disease occurs, not less than 11 per cent of all samples examined having been found contaminated with it. While it has not been definitely proven to be pathogenic to human beings, it is more than likely that it is, as it causes severe lesions in a variety of domestic and other animals.

When to this is added that the prolonged drouth which has prevailed here has been responsible for an unusual amount of dirt in the commercial milk in Honolulu and that the disease in question—infectious abortion—is known to exist here, then there is every reason for taking such precautions as may add to the safety of milk as a food, especially for children, and among these Pasteurization ranks as number one, whether the home or commercial variety.

The price of commercially Pasteurized milk in Honolulu has recently been raised to 12 cents per quart, but frequent bacteriological examination of this milk (see the appended report of the Assistant Territorial Veterinarian) as compared to the untreated

commercial article has fully demonstrated the absolute safety of the product, which at the same time due to the special process of Pasteurization has retained the taste, appearance, nutritive value and digestibility of fresh raw milk. It is, therefore, to be hoped that in some near future the entire milk supply of the city, at least, may be subjected to some process of purification similar to that now applied to the greater quantity now consumed here. An examination of Dr. Case's appended report will show that some of the producers of the samples examined could be prosecuted for selling impure milk, containing, as they do, a larger number of micro organisms than by law allowed, but I have personally examined some of the dairies from which these samples were obtained and found the premises and the milking methods so nearly perfect and the owners so anxious to comply with all regulations that I feel constrained to believe that the present high number of bacteria must be due to the drouth and the resultant amount of dust in the air.

But taken altogether the improvement in the local milk supply which has resulted directly from the eradication of tuberculosis from the herds,—not alone on account of the removal of the diseased animals, but to a very great extent also from the enforcement of the provisions of the Milk Ordinance incidental upon the repeated visits of the inspecting and testing officers (the city milk inspector always accompanies the testing inspector)—can hardly be conceived and must without doubt have contributed greatly to the general health of the community.

When to this is added that outside of the purchase of an automobile, which would have been required anyhow, no special expenditure or appropriation has been required, that in fact this Division, in spite of increased duties, is doing all the work with one \$1200.00 officer less than during the preceding biennial period, then it seems to me *that there is every reason for the extension of this work* to the entire Territory.

Reverting to the transmissibility of bovine tuberculosis to human beings, and especially to children, and at the same time remembering the appalling prevalence of tuberculosis among the population here, and especially among the natives—more than twenty-five per cent of all cases of generalized tuberculosis among children under 16 years being due to the bovine type of tubercle bacilli, that is, tuberculosis introduced by milk from tuberculous cows, then it appears to me indefensible to allow a single tuberculous animal to remain in the Islands since it has been demonstrated conclusively that the disease can be eradicated.

In the estimates of expenditures of the Division of Animal Industry for the present year I asked for \$3,000.00 for the extension of the bovine tuberculosis work to the other islands. As I am informed that no money is available for the purpose, I would respectfully suggest, in case the Board approves of the proposed work and so long as the sum required is insignificant in compari-

son to the human lives which may be conserved, that possibly the means can be obtained from other sources. The last Legislature, for instance, appropriated \$25,000.00 for tuberculosis work. If all of this money has not been expended, I can see no better way to do it than by assisting in exterminating the only known source of human infection, which can be exterminated.

In concluding this subject, the aim and object of which is the *complete eradication of bovine tuberculosis from the Territory of Hawaii*, a subject which has hitherto met with the unqualified approval and encouragement of the members of this Board, I beg to quote the last paragraph of Section V of the Recommendations of the Sanitary Commission (created under Act of the Legislature of 1911) and which reads:

"Third—That a heavy fine be imposed upon any person convicted of selling milk from cows infected with tuberculosis."

"Finally, especial attention is called to the recommendations of the Milk Commission of 1910—that the control of milk be taken from the municipality and given to the Territorial Board of Agriculture in order to secure protection for the whole Territory,—to insure an effective enforcement of regulations governing milk and its source of supply."

QUARANTINE STATIONS.

During the past month the attention of the Board was called to the constant deterioration of fences, posts, gates and feed racks, especially in enclosures where quarantined animals are kept with scant or insufficient food. The two largest enclosures are now in such a condition that animals cannot safely be placed in them. Less than a year ago one of these enclosures was entirely reconstructed, having been completely despoiled by mules being left in it without feed for some time.

As the rules of the Board decree that all expenses in connection with the quarantine of animals must be borne by the owner, and as the owner in this case, in spite of repeated assurances to the contrary, has neglected to repair the damages done by his animals, the matter is respectfully referred to the Board for action.

For the information of the Board, I would submit that the rules require imported animals to be quarantined on premises "provided by this Board" and that the owner may hold that the amount of feed he wishes to give them concerns nobody but himself; that idle work animals should be underfed; that all underfed animals will nibble at posts and boards, and that, consequently, the pens should have been constructed in such a way as to meet these contingencies. That the animals in this last case were neglected can be proved, the keeper having telephoned repeatedly for feed to be sent out and reported the conditions to the owner, but under ordinary circumstances it might prove difficult to establish just *when* the nibbling of a redwood post changes from a condiment to a

substitute for food. If it is held that the pens should be proof against the attack of horse teeth under all conditions and circumstances, then cement or concrete posts must take the place of the wooden ones, and boards and gates protected on all assailable corners and surfaces with sheet metal or wire.

The dog section is rapidly nearing completion, as owing to the small number of inmates, thirteen at the present, the keeper has had considerable time to devote to painting. During the month one consignment of three bull dogs arrived from England and was admitted to the Territory without quarantine. This was due to the fact that a permit to import them had been applied for and granted six months ago, England being officially recognized as free from rabies. A certificate to that effect accompanied the animals and as the steamer bringing them had not touched at any port on its way here from Liverpool, the dogs were entitled to free entry in accordance with Rule VI of this Division.

In regard to the future arrival of dogs belonging to officers or enlisted men of the U. S. forces stationed here, as well as to theatrical companies or other owners of performing dogs, I would respectfully suggest that the Board express an official opinion, by motion or otherwise, to the effect that the term in Rule VI, pertaining to the quarantining of dogs "*on premises provided by this Board*" is in the future, to be interpreted to mean only the Board's quarantine station in Honolulu, unless the Board should decide to allow the new quarantine stations to be constructed at Hilo and Kahului to be provided with sections for dogs. As this question has already been brought up by the Maui deputy, an opinion at this time would be in order, since a change would require the amendment of the present rule, including the Governor's approval and advertising.

In regard to the Hilo quarantine station site, I am informed, as per appended letter, that the site has been granted and surveyed and that the plan is with the agents in this city.

When this is accepted by the Board, it will be necessary to rearrange the relative position of pens, alleys and sheds in the present plan, in accordance with the shape of the new site and to have new blue prints made for the use of the bidders and contractor.

As this will require some little time, I would suggest that I be directed to go to Maui and select the site for the station there, so that I may get to work on the plans for the same.

REGULATIONS FOR QUARANTINE STATIONS.

During the past month a set of rules to be posted at the Quarantine Station and pertaining to the admission of visitors and regulating the actions of owners of quarantined stock while on the premises was submitted for the action of the Board, and is still awaiting the same. As the keeper is constantly complaining

about being unable to properly care for the stock without certain restrictions being placed on owners and visitors, the approval of the Board of the recommended rules is respectfully requested. Copies of the same are herewith appended.

ISLAND HORSES FOR THE U. S. CAVALRY.

A transaction of considerable import to the local live stock industry took place last week when a considerable number of island bred horses were purchased for cavalry mounts to be used by the forces stationed here. Though the matter has been under consideration for a long time and was highly recommended by the officers stationed here and who had learned to appreciate the high-spirited surefooted native horses, it seemed that there were insurmountable obstacles emanating from elsewhere, until suddenly the barriers were let down. The horses purchased were all bred on the Parker Ranch on Hawaii and it is confidently expected that these horses will prove so satisfactory as to establish a demand for many more at remunerative prices. As a regiment is rarely stationed in one place more than two or three years and always take their mounts with them when moved, there seems, as stated, to be brighter times ahead for the horse breeders of the Islands.

LETTERS AND CORRESPONDENCE.

Letters from the Deputy Territorial Veterinarians on Hawaii and Maui pertaining to the proposed stations to be built there, as well as to the tuberculosis control work, are herewith appended. Also copy of a letter to the three deputies in regard to the extension of the tuberculosis work to their respective islands.

ATTEMPTED ILLEGAL IMPORTATION OF DOG.

The appended statement, pertaining to an attempt at landing a dog from the S. S. Ventura on the arrival of this ship at Honolulu, Sept. 30, in contravention of the dog quarantine regulation of this Board, was made before the Deputy Attorney General and is self-explanatory. Pending action of the Attorney General's Department in the matter, I have deemed it proper to make no further comment on the subject in this report, particularly as all the facts relating thereto have already been laid before the members of the Board.

As the efforts of the California State Board of Health at checking the spread of the disease, seem to be of little avail (see the enclosed reports of the Director of the Bureau of Hygienic Laboratories of the California State Board of Health), there is a constantly increasing danger of the disease reaching the Territory, unless the preventive measures established by this Board are strictly adhered to and that both the steamship companies and the

owners of dogs are made to understand that the regulations in question must be complied with, to the letter.

Territory of Hawaii.
Board of Commissioners of Agriculture and Forestry.
Division of Animal Industry.
Animal Quarantine Station.
Notice.

From and after this date owners of quarantined dogs, and other visitors, will be admitted to the kennel enclosure only at the hours of 10 to 11 a. m. and 3 to 4 p. m. on week days, and between 2 and 4 p. m. on Sundays and holidays.

Under no circumstances will owners or visitors be admitted to the kennel enclosure unless accompanied by the keeper who will see to it that visitors do not pet or otherwise handle or feed the quarantined animals.

The wishes of owners or agents in regard to diet and care of quarantined dogs will be complied with when consistent with sanitary or hygienic requirements, but in order to prevent the possible transmission of infection to human beings it is necessary that no actual contact between visitors or owners and the dogs be allowed, except by special permission or in the presence of one of the veterinary officials of the Board.

Horses, mules and asses in quarantine must remain in the enclosures assigned to them for the entire quarantine period, unless a change is required for sanitary or hygienic reasons, in which case permission must be obtained from the Territorial Veterinarian or his assistant and the change effected in his presence.

To remove or replace halters, or to divide or separate bunches of horse stock the animals must be taken to the enclosed yard where a cutting chute is provided for the purpose. Under no circumstances are bunches or flocks to be divided or individual animals roped or caught in the woven wire enclosures.

Visitors to or prospective purchasers of quarantined horse stock will not be allowed to enter the enclosures except when accompanied by the owner or his representative, who will be provided with a duplicate key to the enclosure where his animals are kept.

All imported work animals must be removed from the quarantine station before sunset on the day the quarantine period expires. If not removed a charge of 25 cents per head per day will be made, the same to be collected by the keeper in charge before the animals are released.

All live stock imported for breeding purposes shall be entitled to the use of the station without cost and for such period of time

as may be required for observation, rest, treatment or testing before proceeding to their ultimate destination in the Islands.

.....
Territorial Veterinarian.

Approved:

Honolulu, Sept., 1912.

.....
President and Executive Officer Board
of Agriculture and Forestry.

STATEMENT OF DR. NORGAARD IN RE ILLEGAL IMPORTATION OF DOG
BY MAURICE A. BRASCH.

Pursuant to instructions received from the Attorney General's office as well as from the Board of Agriculture and Forestry, I called, accompanied by the Assistant Territorial Veterinarian, Dr. Case, on Mr. Maurice A. Brasch, at his place of business on Fort street, Honolulu, this afternoon, September 30th, informing him that I was authorized to receive from him a statement, if he so desired to make one, regarding the landing of a dog from the steamship Ventura arriving at the port of Honolulu this morning at 8 o'clock from San Francisco, the said dog being landed in contravention of Rule 6 of the Division of Animal Industry of the Board of Agriculture and Forestry of the Territory of Hawaii. Mr. Brasch admitted his willingness to make such statement and related that the dog in question had been purchased in England; had been shipped by him on board the Lusitania, where at least one other dog was shipped, to New York. Between New York and San Francisco the dog had been left in charge of the expressman in the usual manner, the owners wherever convenient taking the dog from the express car for an airing at such places as Chicago, Omaha and Ogden. In San Francisco the dog was placed on board the steamship Ventura, and according to Mr. Brasch's statement no information was given him in regard to the regulations of this Board prohibiting the admission of dogs to this Territory unless subject to quarantine. Mr. Brasch's memory was refreshed in regard to a somewhat similar case which occurred prior to his leaving for the United States during the month of May, which he admitted he remembered, but thought that the restrictions then in force had long since been rescinded. When asked if he had noticed any posters in the ticket office of the Oceanic Steamship Company or on board the Ventura pertaining to the quarantine of dogs in these Islands, Mr. Brasch stated that he had neither heard nor seen anything to that effect, nor that any officer or employee on board the Ventura informed him or called his attention to the fact that his dog would have to go into quarantine upon arrival here. When asked how the dog was taken

ashore, he stated that the dog was placed in the traveling basket in which it had been carried all the way from England and that Mrs. Brasch carried it under her arm past the customs inspectors ashore, where it was handed to an expressman who carried it to the residence of Mr. Brasch at 1520 Keeaumoku street. The receipt for the same is herewith submitted.

VICTOR A. NORGAARD.

The above statement is correct.

L. N. CASE.

Honolulu, Hawaii, September 30, 1912.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, October 3, 1912.

Dr. Victor A. Norgaard, Chief of Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu, T. H.

Sir:—I beg to submit herewith a report on the work for the month of September.

Tuberculosis Control.

The following animals were submitted to the Intradermal test:

J. H. Cummings.....	1 cow; passed.
M. Riedell	1 cow; “
Geo. Wond	2 cows; “
C. F. Peterson.....	1 cow; “
F. M. Swanzy.....	1 bull; “

These animals had been purchased in different parts of the island for use in the city dairies and were purchased subject to the test which each animal successfully passed. In educating the dairymen up to the point where they will not buy an animal unless it passes the tuberculin test we have advanced a long way in the control of the disease and its eventual eradication. The next step to be gained is to impress upon the dairymen the importance of inquiring into the health records of that herd from which they desire to purchase animals and to select that herd which has been free of the disease at least two or three years. In so doing there is practically no chance of buying an animal which has been exposed to infection. Such an animal even though infected would pass successfully the tuberculin test only to develop the disease later, perhaps in two or three months and infect the entire dairy.

These points are of great importance and it is due to the entire ignorance on the part of dairy owners of the nature and course of the disease with which they are dealing that so much opposition is encountered and so much distrust evidenced in the application and efficiency of the tuberculin test.

Laws and ordinances may be enacted and enforced and a man thus compelled to have his herd tested, but if he has little knowledge of the disease, he will not carry out a thorough cleaning and disinfecting of his premises, without which the tuberculin test is of little avail. The average dairyman sees in the frequent cleaning and disinfecting of his premises only a waste of labor with no apparent results, but let it be said here that his success in maintaining a herd free from tuberculosis is in direct ratio to the frequency and thoroughness of his disinfection.

Bacteriological Examination of the Milk Supply.

In order to obtain some data on the condition of the milk as it reaches the consumer, a series of bacteriological examinations were made of samples taken from dairies scattered throughout the city. The results have been high counts, which indicates that the milk is not being handled with anywhere near the care that is necessary to produce a superior article.

In all fifteen samples were examined, the results of which are as follows:

Procedure.

In each instance a dilution of 1 to 500 was used and with the exception of Samples 1 and 2, in which I made four plates, three plates were made from each sample. The period of incubation varied.

Results.

Sample 1 taken from the Honolulu Dairymen's Association consisted of 14 hr. old milk from Geo. Holt's dairy.

Sample 2 consisted of the above milk after it had passed through the purifying apparatus. In subjecting it to this process it was strained through two layers of cotton and cheese cloth, exposed to a steam temperature of 150° F. and an electric temperature of 164° F. and then cooled at once to a temperature of 40° F.

After incubating for 48 hrs. at room temperature (27° C.) examination gave the following:

Sample 1.....	10,540,000 bact. per cc.
“ 2.....	500 “ “ “

This shows admirably the effectiveness of the Groucher system of purifying milk.

Sample 3—Geo. Wond	30,000 bact. per cc.
“ 4—T. F. Farm.....	2,033,000 “ “ “
“ 5—K. Yamashita	1,285,000 “ “ “
“ 6—T. F. Farm.....	2,773,000 “ “ “
“ 7—F. Medeiros	1,520,000 “ “ “
“ 8—P. Miyakawa	850,000 “ “ “
“ 9—R. Davison	750,500 “ “ “
“ 10—W. P. Alexander.....	324,450 “ “ “

These samples were taken from the milk as it was ready to be delivered to the consumer and, with the one exception of Geo. Wond, must be considered dirty milk. Of the two samples taken from T. F. Farm, No. 4 represents milk from his own herd and No. 6 mixed milk from Chas. Lucas, Joe Gouviera and T. McGuire dairies, which he retails in bottles. The count was made after 120 hrs. incubation at 27° C.

Sample 11—S. de Nobriga.....	2,820,000	bact. per cc.
“ 12—Frank Valph	3,020,000	“ “ “
“ 13—M. Kawamura	1,120,000	“ “ “
“ 14—Richard Kapena	945,000	“ “ “
“ 15—V. Souza	3,224,300	“ “ “

The count was made after 96 hrs. incubation at 27° C.

That such counts should be possible shows that something is radically wrong in the handling of the milk; either the product is contaminated when being drawn from the cow or when it is being cooled and put into containers; probably it is a combination of the two.

Extreme care should be used in the production of such an important food as milk. The opportunities for its contamination are many and the overlooking of a single point will result in the production of an inferior article. To obtain a clean product clean methods must be employed. It avails nothing to milk into a sterile pail through a small opening if the flanks and udder of the cow are dirty, the floor a foot deep with manure and the animal switching its tail continually.

Taking for granted that the milk is drawn under ideal conditions, i. e., clean stable; clean animal with tail confined; clean milker with clean, properly constructed pail, the milk will become contaminated and show a high bacterial count if poured over a cooler which is exposed to the dust and dirt which can blow into the milk room from the street or barn yards and then put into improperly cleaned bottles or cans.

These are points to be closely watched by the milk inspector in his daily round of inspection. Milk can and should be produced here with a count of 100,000 bact. per cc. or less and nothing over that amount should be allowed. If the count is higher, it shows conclusively that some point in the routine of production is being overlooked or slighted. This should be rectified and proper methods enforced by the inspector.

Inspection Service.

One trip was taken to Schofield Barracks on September 5th for the purpose of giving the dogs quarantined there a final inspection and to release them, as the 120 days expired on that date. As far as could be observed, they were in fine condition and nothing other has developed since their release. It is to be hoped that

if in the future dogs are to be quarantined on the reservation, suitable and better appearing kennels may be erected.

Live Stock.

List of live stock entering the Territory at the port of Honolulu :

- S. S. Sonoma—San Francisco, Sept. 2—
1 black Spitz dog—Thomas Lasso.
- S. S. Wilhelmina—San Francisco, Sept. 3—
1 white Toy poodle—Miss Thornton.
4 cts. poultry.
- S. S. Honolulan—San Francisco, Sept. 11—
31 mules, 4 horses—N. H. Churchill.
41 mules—G. Schuman.
4 Hereford bulls—Haleakala Ranch.
4 cts. poultry.
- S. S. Makura—Vancouver, Sept. 11—
1 dog—Geo. Freeland (quar. at Honolulu).
- S. S. Sierra—San Francisco, Sept. 16—
13 cts. poultry.
- S. S. Persia—Orient, Sept. 18—
1 ct. Jap games.
- S. S. Mongolia—San Francisco, Sept. 20—
1 lioness; 2 leopards; 2 pumas—Carlos Bernado.
- S. S. Ventura—San Francisco, Sept. 30—
1 dog—Maurice Brasch.

Respectfully submitted,

L. N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, Sept. 30, 1912.

Hon. Board of Commissioners of Agriculture and Forestry,
Honolulu.

Gentlemen :—I respectfully submit my report of the work of the Division of Entomology for the month of September, as follows :

During the month there arrived 36 vessels of which 24 carried vegetable matter. The usual careful inspection was made with the following results :

<i>Disposal with principal causes.</i>	<i>Lots.</i>	<i>Parcels.</i>
Passed as free from pests.....	1168	27,593
Fumigated	11	54
Burned	27	27
Returned	1	14
Total inspected	1207	27,688

Rice Shipments.

During the month 23,831 bags of rice arrived from Japan, each shipment accompanied with a certificate of fumigation at Kobe and after our careful examination all shipments were passed as free from pests.

Pests Intercepted.

Twenty-seven packages of fruit and vegetables were confiscated from passengers and immigrants during the month. In a shipment of Orchids from Manila we found larvae of *Aetheopeus aterrimus*, a few *Elaterids*, *Staphylinids*, a *Capsid* and a few *Crickets*. In soil around a plant from Japan we found an Earwig with a cluster of eggs. Fourteen boxes of lemons were returned to the shipper at San Francisco on account of being badly infested with the Lemon scale, *Aspidiotus hederae*. A basket of apples which a passenger brought from Seattle showed the fruit badly infested with the Oystershell scale, *Lepidosophes ulmi*, and these were destroyed.

Beneficial Insects.

We distributed 12 lots of Japanese beetle fungus to various applicants. We find it very difficult to get people to collect the beetles for inoculation and our time is so limited that we are unable to furnish inoculated beetles unless those desiring them will deliver quantities to the office.

Hilo Inspection.

Brother M. Newell reports the arrival of 9 vessels, 4 of which carried vegetable matter and 1 moulding sand. There were 191 lots and 1847 packages of fruits and vegetables. Eleven packages had to be treated before delivery.

Inter-Island Inspection.

During the month of September 63 steamers were attended to and the following shipments were passed:

75 packages Plants.
573 bags Taro.
3 packages Fruits.
2 packages Cocoanuts.
1 package Lilyroot.

654 packages total inspected and passed.

The following packages were refused shipments:

22 packages Fruit.

7 packages Plants, infested and carrying soil.

29 packages total inspected and refused shipment.

Respectfully submitted,

E. M. EHRLHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

REPORT OF FOREST NURSERYMAN.

Honolulu, Sept. 30, 1912.

Hon. W. M. Giffard, President and Executive Officer, and Members Board of Agriculture and Forestry, Honolulu, Hawaii.

Dear Sir:—I herewith submit a report of the principal work done during the month of September:

Nursery.

Distribution of Plants.

	In seed boxes	In boxes transplanted	Pot grown	Total
Sold . . . . .	...	...	151	151
Gratis	7000	300	1372	8672
	<hr/> 7000	<hr/> 300	<hr/> 1523	<hr/> 8823

Collections on account of plants sold amounted to \$2.85. The dry weather and the short time that now remains before Arbor Day, when trees will be given gratis, there is no doubt accounts for the small quantity sold.

Seed Collecting.

The collecting of seed on *Tantalus* has been continued and we are now getting together quantities of such seed that may be wanted during the coming planting season. From *Tantalus* we have already collected 15 lbs. of *eucalyptus robusta* seed, 3½ lbs. of *eucalyptus citriodora*, and about 1½ lbs. of *koa*. Smaller quantities of other varieties are being collected.

Plantation Companies and Other Corporations.

The plants distributed from stock raised for companies and corporations who are supplying labor and material for propagating the trees, amounted to 3800 pot grown and 12,000 seedlings in seed boxes.

At the Nursery and Makiki station we are at present propagating 12,000 ironwood trees to be delivered in transplant boxes ready to set out in December; also 200,000 assorted eucalyptus seedlings to be delivered in a few weeks. Another order for 300,000 assorted eucalyptus, to be delivered about December or January, will be started soon.

Makiki Station.

Rearranging the quarters and building an extra shed, also getting ready trees for Arbor Day, constituted the principal work for the month.

The writer, at the request of the ladies of the Outdoor Circle of the Kilohana Art League, has devoted a good deal of time to the pruning and planting of trees along the streets. A much needed pruning of the pink and white shower trees along both sides of Piikoi street has been done. This work required careful attention as the trees had been neglected and both the sidewalks and the driveway were beginning to be encroached on by the low hanging branches. The trees on other streets require attention in the same manner. The favorable comments which we have heard since we started the pruning of trees along the streets would indicate that most people desire to walk on the sidewalk instead of being compelled to leave the sidewalk and take to the driveway owing to the low hanging branches. The interruptions do not always come from the sidewalk trees but also from trees that are planted on private property and allowed to branch over the sidewalk and on to the street in some cases. A law to enforce judicious pruning on streets and sidewalks would be a step in the right direction. Circular No. 2 of the Division of Forestry comments on this very subject in the following words: "Trees should never be allowed to intrude upon the street or highway. Branches must be cut to avoid scratching the tops of vehicles, or people's hats or umbrellas on the sidewalks," etc.

The work of planting both sides of Wilder Avenue is progressing and will be finished in a few days. A gang of prisoners from the county jail is doing the work. This street extends from Pensacola street to Metcalf street. About 200 poinciana regia trees will be used which are being supplied from the Nursery.

U. S. Experimental Planting, Nuuanu Valley.

The long, dry spell has kept the planting back and we have been

obliged to care for the trees at the Makiki Station until there is moisture enough to warrant the planting of more trees.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

CARE OF THE HORSE.

(Read before the Medical Association of the San Francisco Veterinary College, 1818 Market street, San Francisco, California, by Student Robert Cilker, during 1911-12 session.)

Sand Cracks.

Sand cracks are classified according to their location. They are called toe cracks when occurring in the middle line of the horn of the toe, and a quarter crack when occurring in the horn of the quarters. There are also sand cracks of the sole and of the frog met with, but are not plentiful, and rarely serious enough to cause much trouble.

The toe crack is met with more often in the hind foot than in the fore, while the quarter crack is met with more often in the fore feet, and is here usually confined to the inner side. The portion of the wall known as inside and outside of the toe is seldom affected. A crack is called complete when it extends from the coronary margin of the wall to its wearing edge, and is incomplete when it is not so extensive. A simple crack is one that occurs in the horn only and does not implicate the sensitive structures beneath. A complicated crack is one that is deep enough to allow of laceration and subsequent inflammation of the sensitive membrane; such complications may vary from a simple inflammation set up by laceration, and irritation of the sensitive structures, by particles of dirt and grit that have gained entrance through the crack, to other and more serious changes in the shape of the formation of pus, hemorrhage from the blood vessels, caries of the coffin bone, or there may be a tumor-like growth of the horn on the inner surface of the wall.

Causes of Quarter Crack.

One of the causes of quarter crack is the faulty confirmation of the animal, and I will take up this cause first. In the animal, with turned out toes, more than a fair portion of the animals weight is thrown upon the horn of the inner quarter; here there are three causes exerting their influence together. The horn is brittle, the wall of the inner quarter is thinner than that of the outer, additional weight is placed upon it and fracture is the result. Another

cause for quarter crack is in the condition of the hoof known as contracted heels. With the contraction and its pressure upon the sensitive structures within the region of the quarters and frog has arisen a low type of inflammation and the horn has become dry and brittle in this region. The exciting cause in its fracture is found in a hard day's work upon a hard, dry road, with perhaps a suddenly imposed improper distribution of weight, due may be to stepping upon a loose stone or a succession of such evil transfers of weight due to traveling upon a road that is very rough in its whole extent. Another cause for quarter crack is where the wall is very soft from poulticing or perhaps due to the animal feeding in a pasture that is very moist. When this animal is put to work upon a hard dry street the sudden change from extreme moisture to extreme dryness, combined with hard work will cause the wall to deteriorate and may be the cause of a crack. Unskilful shoeing also plays a part in causing sand crack. Removal of the periople by excessive rasping is a pre-disposed cause. Cracks or their starting points may also be caused by using too wide a shoe. Poor shoeing does not cause cracks though as much as many other things, for more depends on the state of the wall and conformation than upon the existing cause.

Toe Crack.

This crack is met with nearly always in a heavy animal, in the hind feet, and is directly attributable to starting a heavy load.

Cracks of the Sole and Frog.

Sand crack of the sole and frog is but seldom met with and then it is in connection with some exceptionally deteriorated quality of the horn, or occurs as the result of a direct injury and from a badly pumiced foot.

Treatment.

In a simple case where the crack is superficial and close under the coronary margin of the wall a sharp cantharides blister to the coronet immediately above it will be very effective, as in this manner an increased secretion of the horn is brought about and the crack prevented from becoming longer. No matter what treatment you use a blister applied to the coronary margin is always beneficial. To get the best result from a blister it should be repeated several times and at intervals of about two weeks. Another method known as clamping the crack is usually used where the crack is rather long. There are a good many different kinds of clamps and so I will only endeavor to describe one. This clamp called Koster's Sand Crack Clamp, is rather wide with five teeth on each side. A groove is burned on each side of the crack to accommodate the jaws of the instrument and the clamp itself pressed home by means of a special pair of forceps. No clamps

should be put on unless the wall is moderately strong, and the wall should be thick. All clamps are put on for the same purpose, to try and stop any movement of the wall in the region of the crack.

Other means employed are by paring out on both sides of the crack, starting about a half an inch on both sides of the crack and cutting it out to the bottom at an angle. Apply an antiseptic dressing and over this cotton, then wrap the whole foot with tape as tight as possible. The tape is used for two reasons, to dry and keep out as much dirt as possible and stop the movement of the wall in the region of the crack.

The following prescription is one of the most beneficial used in the treatment of cracked or brittle feet:

R

Yellow Wax
Olive Oil
Lard
Venice Turpentine
Honey, of each 8 ounces.

Melt lard, wax and honey (slow fire), then add the rest, and stir until cold. Apply once daily.

Surgery.

This method is only indicated when the crack is greatly complicated by the presence of pus, or by the growth of adventitious horn on the inner surface of the wall. When the crack does not extend the whole length of the wall, the best method is to cut out a triangular piece with the base uppermost, cutting as deep as the sensitive lamina. With the removal of the horn the diseased structures are exposed to view. All such should be removed by a free use of the scalpel and a suitable dressing afterward applied. If the crack runs the whole length of the hoof take out a piece on either side of the crack, the whole length of same. After treatment is exactly the same as the one just referred to.

Shoeing.

A partial rest is given to the affected parts by easing the bearing of the shoe at the point required. This may be done either by removal of part of the wall at the spot indicated, or by thinning the web of the shoe in the same position. Never have a clip directly under the crack or where the weight would fall. If it is a toe crack the usual clip should be dispensed with and a clip on each side made to take its place. At the same time care should be taken to avoid throwing the weight forward. In case of a quarter crack, where the constant movement of the part under the expansion and contraction of the foot makes itself most felt, it is wise to apply a shoe with clips fitting moderately tight against the inside of the bars. By this means movement will to a large extent be stopped.

MISLEADING EVIDENCE.

We have recently received several samples of fertilizers with requests that we would express an opinion as to the manure, because their colors created suspicion; indeed, there are hacendados who judge manures almost entirely by appearance and smell, and are thus liable to make serious mistakes.

Appearance, smell, or color are no guides; the only true test in buying fertilizers is chemical analysis, although the best test is made by the crop itself.

Nitrate of soda in appearance does not differ much from coarse impure salt, and can be relied upon, when imported from the mines in Chile, to contain approximately 16% of nitrogen.

Sulphate of ammonia is a substance which is very variable in appearance, it may be gray or white, or yellow, or blue, without any real difference in the quality; it contains more nitrogen than nitrate of soda, but being less soluble than the latter, it is consequently less valuable.

Superphosphate may be light gray, or a dark gray or brown; its tint simply depends on the color of the raw material from which it is manufactured. The hacendado need not trouble about the tint so long as the percentage of phosphate of lime is up to the guaranteed standard.—Exchange.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC.,

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 30 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughe, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications
SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207
HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

NOVEMBER, 1912.

No. 11.

Our plant pathologists may be interested in an article in this number, containing a synopsis of an address by Professor Salmon to the British Mycological Society last year on problems of economic importance regarding plant diseases.

A bulletin on citrus scab has been received from the University of Florida experiment station. It is by H. S. Fawcett, and in a table of references quotes J. E. Higgins in a bulletin of the Hawaii experiment station issued in 1905. The Florida bulletin gives three modes of prevention—1, destroying all sour orange or other worthless growth; 2, spraying when necessary; 3, cutting out scabby growths.

Intelligence of vast importance to the future of the American raw cotton industry is contained in an article in this number on cotton-growing in Argentina. That country is there said to have as large an area adapted to cotton-growing as the United States. Although the Argentina industry is now handicapped for lack of labor, an enormous Spanish immigration, together with the exploitation of a Barcelona syndicate, may tell a different story in the not distant future.

There will surely be no question about the extension of bovine tuberculosis control work to the islands other than Oahu, either through action by the incoming boards of supervisors for the different counties, or, if this should be impracticable for lack of revenue, by the legislature in measures to provide either the county boards or the board of agriculture with the requisite funds for the campaign. It will not do to compel the municipality of Honolulu to rest under the menace of infection from outside after having its herds made clean through the combined measures of the board of supervisors and the board of agriculture.

That strange disease reported as existing among horses in Waipio Valley, mentioned by Dr. Norgaard in his monthly report in this number, has proved to be a recrudescence of the glanders epidemic of several years ago. This the Territorial veterinarian ascertained on personal investigation on the ground, and on his return President Giffard despatched him back with instructions to

carry out his recommendation of a quarantine of the district along with a roundup of all the stock. This action was approved and ratified by the board at its monthly meeting.

BRAZIL'S ENORMOUS RUBBER RESOURCES.

An article on the wild rubber trees of Brazil in the Bulletin of the Bureau of Agricultural Intelligence and Plant Diseases contains facts that might well strike dismay into the developers of rubber in other countries, were it not for the saving clause, so to speak, of the inaccessibility of the vast resources of the wild article for marketing—a condition that is not likely to be overcome in the near future, or until the rapidly growing demand for rubber will call for the prodigious reserves of the Brazilian forests. The article says in part:

“The world’s consumption of rubber is calculated by M. A. Dubosc as being, for 1911, 85,000 tons, with a co-efficient of increase of 8% per annum, which would raise the total world’s consumption to 180,000 tons about 1920, and the business turnover calculated by Sir H. Blake at 1,100 million per year, would attain to more than 2½ thousand million francs.

“Of the whole of this enormous consumption, the greatest part is supplied by Brazil with its wild rubber, Para, which also ranks highest in point of quality. In 1910 Brazil is said to have produced 38,000 tons of Para, that is, one-half of the world’s consumption.

“Each great producing region appears to have its special rubber plant. In Brazil the area of Amazonas, which is the principal producing centre, amounts to nearly 6½ million sq. kilometers (2,509,000 sq. miles) i. e., 12 times the area of France. In all parts of this state there are found one or another of the varieties of *Hevea* or *Castilloa* but especially that wonderful tree, *Hevea Brasiliensis*, which, with well-conducted tappings can when mature, at about 35 years, yield up to 12 kgs. (25.4 lbs.) of rubber. The number of trees standing in the two States of Para and Amazonas is estimated at 200 million. In the State of Amazonas, the field of working of the natural ‘seringaes’ (rubber estates) is growing day by day, in consequence of exploration being carried to the very remotest ramifications of the great rivers, which are the confluent of the Amazon; unfortunately the impossibility, almost, of transport make the cost price unremunerative. Still the reserves of rubber ripe for tapping in the Amazonian region are not limited to the great number of *Hevea Brasiliensis* forming the principal wealth of that country. They are also formed by other natural rubber bearing species of appreciable value, at least equal to that of some famous plants of other countries.”

EVOLUTION OF RUBBER.

An article on rubber expositions as a trade stimulus, by Sir Henry A. Blake in the *India Rubber World*, contains the following passages, the remarks about rubber for roadmaking being of universal interest :

"During the exhibition it became known that an international exhibition on somewhat similar lines was projected for New York, and now that the project has materialized, further progress will doubtless be made in the solution of many problems with which rubber planters and manufacturers have still to deal. Great as is the production in sight, the horizon of demand is ever widening. One hundred and forty years ago, its only known practical use was as an eraser of pencil marks. Today it ministers to the wants of the infant in his cradle, as well as to the comfort of the aged, while in one form or another it enters with frequency into the countless demands of civilization.

"Among the exhibits at the Agricultural Hall, there was one that promised important developments. This was a section of rubber prepared for roadwork but not yet fulfilling all the necessary conditions that would enable it to compete with the quarry and the forest for the preparation of road surfaces for heavy traffic. That this difficulty will be overcome, there can be no doubt, and when it has been, any possible doubt of a limitless demand will vanish like a moving mist. Silent streets with the cessation of the turmoil and roar of traffic, would in relief of brain fag to the busy worker, be the most potent factor for health and strength ever offered to the business men and women of great cities, while imperviousness to water would obliterate dust and mud, carry off equally heavy rains or melting snows and save the endless labor on frost upheavals every spring that try the equanimity of dwellers in New York.

"There is a giant in the path whose name is 'skid,' but Jack the Giant Killer will emerge from some busy inventive brain and demolish the skid by a non-slip grip surface that will withstand wear and tear and secure safety in all weathers in horse or motor. From which side of the Atlantic will he emerge? There's the rub!"

The *Cuba Review* for September, 1912, gives a table which shows that the chief exports of fruit and fruit products from Porto Rico to the United States during 1912 were valued as follows: Grape fruit, \$524,976; oranges, \$584,368; pineapples, \$683,801; lemons, \$3,131; limes, \$960; canned pineapples, \$258,671. Shipments of honey to the value of \$42,251 were also sent.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, Oct. 29, 1912.

Hon. W. M. Giffard, President and Executive Officer, and Members of the Board of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I beg to report on the work of the Division of Animal Industry for the month of October, 1912, as follows:

Animal Quarantine.

Pursuant to instructions received by the President of this Board after the last monthly meeting, in regard to the admission of performing animals subject to quarantine under the rules and regulations of the Board, a circular letter, dated October 22, 1912, was sent to all theatres and amusement agencies in Honolulu informing them as per the appended copy, that henceforth all such animals would have to undergo the regular quarantine, the same as other animals for whatever purpose imported.

A few days before this letter was sent out there arrived in Honolulu three performing Shetland ponies which, at a special meeting of the Committee on Animal Industry, were allowed to be quarantined in a shed provided for the purpose at the rear of the Liberty Theatre. The quarantine on these animals will expire on October 29, 1912, and there will consequently be no cause for action of the Board on an application for permission to exhibit the ponies at Kahului and Hilo, and the agents have been so informed.

With the receipt of General Macomb's acknowledgment of the letter informing him that no further special permit to quarantine dogs belonging to the military authorities outside of the Territorial Animal Quarantine Station would be granted, this subject may be considered as definitely disposed of.

Honolulu Quarantine Station.

For the display of the rules governing the actions of visitors and owners of quarantined animals, as approved by the Board, a glass fronted case has been ordered and will be placed at the main entrance to the station. Below this case a push button, connecting with an electric bell, will be placed, so that the keeper may be summoned to admit visitors and others calling on business outside the regular visiting hours. During these hours, 10:00 to 12:00 a. m. and 2:00 to 4:00 p. m., the main entrance will be kept open and the keeper be in attendance, while at all other times the station will remain closed except for the admission or discharge of animals, so that the keeper may give his full time to the care and keep of the station and the animals.

Hilo Quarantine Station.

The surveyed plan of the site of the Hilo Quarantine Station was received from Messrs. T. H. Davies & Company during the past month, and in accordance with instructions received, a rearrangement of the enclosures, chutes and feed-rooms, as planned in the original blue print, has been effected. A copy of the same has been sent to the Deputy Territorial Veterinarian at Hilo for his approval or for such alterations as he may wish to suggest after examining the general topography and surface of the new site. When returned to this Board the final plans and specifications will be prepared and tenders advertised for.

Kahului Quarantine Station.

During the past month the chairman of the Committee on Animal Industry visited Kahului, Maui, and selected a piece of land which Messrs. Alexander & Baldwin had been good enough to offer to transfer to this Board for a nominal consideration, for the purpose of the establishment of an animal quarantine station for the island of Maui. Messrs. Alexander & Baldwin have promised to have this piece of land surveyed, and when a plan of same is received a sketch of pens, chutes and enclosures will be made so as to come within the allotted appropriation of \$1,000.00 set aside by the Board for this purpose.

Attempted Illegal Importation of Dog.

In regard to this subject, it appears that owing to the indisposition of the County Attorney, it has been impossible for the Attorney General to take any further steps in regard to the prosecution of Mr. Brash for attempting to import a dog in circumvention of the regulations of this Board. The steamship "Ventura" will return to this port from Australia on November 1, 1912, when it is the Attorney General's intention to prosecute the master of that vessel in connection with the same case.

Tuberculosis Control Work.

According to instructions received from the President of this Board, a letter was addressed to the deputy Territorial veterinarians at Hilo, Kahului and Lihue, requesting them to take the necessary steps to ascertain in how far it would be advisable or feasible to extend the tuberculosis control work to the Islands outside of Oahu, at the present time. The respective answers to these letters are herewith appended, and while there seems to be a certain desire to have all dairy animals tested for tuberculosis appears to be a question whether so important a subject should be presented for action by the respective Boards of Super-

such a late time in their incumbency of office. To assume the responsibility for the promulgation of an ordinance requiring the testing of all dairy cattle and the destruction of all animals found to be affected with tuberculosis, by these various boards just before a majority of their members may be retiring from office can hardly be expected of them, and as some time will be required for the further education of both dairy owners and milk consumers to thoroughly understand the importance of this measure, it may be better not to force an issue at the present time, but rather to get prepared to present a uniform milk ordinance for the approval of the respective new Boards of Supervisors as soon as possible after they have become established in office.

About twenty head of cattle have been tested during the month, most of them dairy animals being bought or sold or transferred from stable to stable, out of which number three animals have reacted; at the same time the assistant Territorial veterinarian has given considerable time to the testing and examination of milk samples as collected by the municipal milk inspector. Dr. Case's report shows that while there is an improvement over the conditions reported on last month, there is still room for a considerable reduction in the number of micro-organisms found in most of the samples.

Epidemic Among Horses on Hawaii.

On the 28th inst. a message was received from Messrs. Schaefer & Company informing the Board that an outbreak of an unknown disease had occurred among the horses in Waipio Valley on Hawaii and that six (6) head had died, requesting that the Territorial Veterinarian be asked to investigate. Four years ago an epidemic of glanders occurred in Waipio Valley, resulting in the loss of more than twenty (20) horses, but judging from the information available it did not seem likely that the present disease could be glanders, and the Territorial Veterinarian has consequently been instructed to make an investigation immediately. In order to prevent the further spread of the disease a wireless message addressed to the manager of the Kukuihaele Plantation Company was forwarded immediately instructing him to place Waipio Valley in quarantine, that is, not to allow any sick or suspicious animals to leave the valley, but to hold the same for examination by the Territorial Veterinarian upon his arrival there. As soon as the true nature of the disease has been ascertained I shall report to the Board, and expect to return from Hawaii within a week or ten days.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, Oct. 31, 1912.

Dr. V. A. Norgaard, Chief of Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu, T. H.

Sir:—I beg to submit herewith a report for the month of
October:

Tuberculosis Control.

The following animals were subjected to the intra-dermal test:

		T.	P.	C.
October	7-10—Mrs. Andrews	1	1	0
"	9-12—Bernal Live Stock Co.....	12	10	2
"	10-12—A. Waterhouse	5	5	0
"	16-19—F. C. Atherton.....	1	0	1
		<hr/> 19	<hr/> 16	<hr/> 3

Although the number examined is small it contains points of considerable interest. The animals tested for the Bernal Live Stock Company came from Kona and were purchased from the Gouveira Ranch, which supplies different dairies on this island with a good many milch cows. Out of two hundred (200) head of cattle arriving here from Kona ten (10) have been condemned on the test which, if this can be taken as any criterion, would show 5% of tuberculosis among the dairy animals in Kona, Hawaii. This further means that with every hundred head of cattle shipped in here from Kona there are five tuberculous animals to become centers of infection.

This clearly demonstrates the value of eternal vigilance in the campaign against tuberculosis and the great value of a milk ordinance, such as we have, which requires that every dairy supplying milk for human consumption must be composed of animals free from tuberculosis, in other words animals which have successfully passed the tuberculin test.

By keeping careful watch over the dairies we have been able to eliminate ten centers of infection which have been imported directly from the island of Hawaii. Had these ten animals gone untested they would have rapidly spread the disease either directly or indirectly to every dairy on the island of Oahu, and the labor of years would have been lost and conditions would have rapidly reverted to what they were when systematic testing was first established.

Dairy stock shipped from the other islands are purchased by dairymen here subject to the test so the condemnation of these animals entails no loss to them as other animals are sent to take their places. It has been the natural tendency on the part of the

dairymen to send the condemned animals back, but to allow this would only be to continue the disease and help its spread. Refusing permission to return them and compelling the dairymen under the ordinance to remove them from their dairies has forced these tuberculous animals to the slaughter-house and they have been removed once and for all from endangering human life and from spreading the disease to other dairies.

This forcibly brings to our attention the absolute necessity of continuing the test to the other islands. It is evident that this must be our plan of campaign if we hope to keep the milk supply of the City and County of Honolulu uncontaminated and eventually eradicate tuberculosis from these islands.

On October 16th to 19th I tested and condemned a cow for Mr. F. C. Atherton. The history of this cow, as far as our records show, is interesting and points out the danger of having in the herd or on the premises any untested animal and also the necessity of inquiring into the condition of the animals in a pasture before allowing other animals to go into it.

The cow in question was first owned by Mr. T. H. Cummins and while in his possession successfully passed the tuberculin test on May 25, 1910, and also on February 21, 1911, and was sold to Mr. Atherton on January 23, 1912. At the time of purchase Mr. Atherton had on his premises an untested cow which had been in his possession for about five years and which had recently returned from Chas. Bellina's pasture at Niu, where it had been for some time.

On the first general test quite a number of condemned animals from Mr. Isenberg's herd were sold to Mr. Bellina for a nominal sum and placed by him in this pasture at Niu for the purpose of fattening before sending them to slaughter. These animals either directly or indirectly passed the infection to Mr. Atherton's cow, which then returned to his dairy and was placed with the newly purchased animal.

On March 1st I was called upon to test these two animals. The one which had recently returned from Niu gave a large typical reaction and was condemned and branded. Post-mortem revealed a case of well advanced generalized tuberculosis and the entire carcass was condemned at the slaughter house. The newly purchased cow successfully passed the test.

What significance can be attached to the fact that this animal, which had been in immediate contact with the diseased one for a period of over a month, passed the test. To one who is acquainted with the course of the disease in the animal system, and the paths through which the organism is eliminated and subsequent infection occurs this does not mean that the animal is not infected, for the chances are a hundred to one of its being so, but that the disease is in the period of incubation, that is, multiplication of the organisms had not reached a stage sufficient for the

production of lesions in the animal tissue. That the cow would react at a later date was almost a certainty.

Such being the circumstances Mr. Atherton was advised to have the cow retested at a later date, consequently on October 16th I was called upon to again test this animal. Upon this test she gave a large typical reaction and was condemned and branded. After careful post-mortem at the slaughter-house Dr. Monsarrat reported that he was unable to find any lesions of tuberculosis. This cannot be considered as meaning that there was an entire absence of disease, but rather that the lesions were so small and so few as to readily escape detection. It is very easy to overlook a few small nodules in the substance of the large lung of a cow or one or two small nodules in one of the numerous lymphatic glands of the body, and one rapidly progressing lesion is enough to cause a reaction to the test and reveal the presence of disease.

I think we can safely say from the results of the post-mortem examination that this cow was not a danger to public health at this stage of the disease, but who can say when she would become dangerous, who can say when she would begin to pass tubercle bacteria in her milk and feces. I think that in a few months more she would have become a real live danger to her owner and to any animal with which she might become associated.

This brings us to the question: what relation does the size of the swelling in a reaction bear to the disease in the animal system as demonstrated by post-mortem examination? It has been demonstrated repeatedly by post-mortem examination that the size of the reaction bears no direct relation to the amount of the disease. That it has some important relations to the disease is apparent. After much thought upon the subject and many post-mortems I have reached the conclusion that while the size of the swelling has no direct relation to the *amount* of disease it has a *very close* relation to the progress and activity of the tubercle bacteria within the animal system. This will vary as will the size of the reaction vary as the resistance to the disease varies.

Bacteriological Examination of the Milk Supply.

During the last month twenty-five (25) samples of milk and cream from different dairies were analyzed for their bacterial content with the following results:

No. 1—Mixed milk from Andrade, Moanalua, Bellina and Salina dairies. Exam. after 72 hours inc. at 27° C. 229.160 bact. per cc.

No. 2—Same as above taken from purifying machine. Exam. after 72 hours inc. at 27° C. 1,500 bact. per cc.

No. 3—George Holt dairy. Exam. after 72 hours inc. at 27° C. 823.330 bact. per cc.

No. 4—Same as above after passing through the purifier. Exam. after 72 hours inc. at 27° C. 1330 bact. per cc.

No. 5—Cream after pasteurization at 150° F. for 10 m. Exam. after 72 hours inc. at 27° C. 273,330 bact. per cc.

No. 6—Waialae Ranch milk. Exam. at 72 hours inc. at 27° C. 396,000 bact. per cc.

No. 7—Jersey milk from Mrs. Isenberg's herd. Exam. after 72 hours inc. at 27° C. 65,000 bact. per cc.

No. 8—H. B. Brown dairy. Exam. after 72 hours inc. at 27° C. 119,160 bact. per cc.

No. 9—Cream after pasteurization at 150° F. for 10 m. Exam. after 72 hours inc. at 27° C. 100,000 bact. per cc.

No. 10—K. Inouye dairy. Exam. after 96 hours inc. at 27° C. 39,000 bact. per cc.

No. 11—S. Tsumoto dairy. Exam. after 96 hours inc. at 27° C. 876,660 bact. per cc.

No. 12—S. Hirata dairy. Exam. after 72 hours inc. at 27° C. 120,000 bact. per cc.

No. 13—F. Gouveira dairy. Exam. after 72 hours inc. at 27° C. 100,500 bact. per cc.

No. 14—T. F. Farm dairy. Exam. after 72 hours inc. at 27° C. 126,660 bact. per cc.

No. 15—J. M. Whitney dairy. Exam. after 72 hours inc. at 27° C. 50,000 bact. per cc.

No. 16—T. H. Cummins dairy. Exam. after 72 hours inc. at 27° C. 75,500 bact. per cc.

No. 17—W. E. Wall dairy. Exam. after 72 hours inc. at 27° C. 30,500 bact. per cc.

No. 18—Waialae Jersey milk (house) 5 hours old. Exam. after 72 hours inc. at 27° C. 30,330 bact. per cc.

No. 19—Waialae Jersey milk (barn) 5 hours old. Exam. after 72 hours inc. at 27° C. 70,000 bact. per cc.

No. 20—Waialae Ranch milk 5 hours old. Exam. after 72 hours inc. at 27° C. 383,750 bact. per cc.

No. 21—Cream after pasteurization at 150° F. for 10 m.; 24 hours old at 40° F. Exam. after 72 hours inc. at 27° C. 210,000 bact. per cc.

No. 22—George Holt dairy; 6 hours old; temp. 82° F. Exam. after 72 hours inc. at 27° C. 650,000 bact. per cc.

No. 23—T. F. Farm dairy, fresh from cooler. Exam. after 72 hours inc. at 27° C. 217,330 bact. per cc.

No. 24—T. F. Farm dairy, fresh cream. Exam. after 72 hours at 27° C. 3,190,000 bact. per cc.

No. 25—I. Nayaki dairy; 8 hours old on ice. Exam. after 72 hours inc. at 27° C. 1,322,000 bact. per cc.

There has been some improvement in the manner of handling the milk in the dairies during the last month, but there is still room for further improvement. Looking at samples Nos. 6 and 7, 18, 19 and 20 it is very evident that greater care is used in the handling of milk from Mrs. Isenberg's Jersey herd than is used in the production of milk from the ranch herd. So marked a dif-

ference should not be; as much care should be exercised in the production of milk from one dairy as the other. There seems to be a disposition on the part of the Dairymen's Association to accept milk no matter what its condition and from those who have not even a permit to sell milk. This is no doubt due to the confidence they have in their purifying apparatus and its demonstrated ability to considerably lower the bacterial content of milk subjected to its influence, but there is a higher principle involved. The position occupied by the Dairymen's Association in the system of milk supply of the city is such as enables it to exert a powerful influence toward the betterment of the product as it reaches them, and it should use this influence to encourage its many contributors to produce a clean produce in a sanitary way.

Samples Nos. 23, 24, 25 show counts far above what they should be and from one dairy in particular which has shown no improvement over last month. Advice and instructions have been given and the Municipal Milk Inspector is keeping close and careful watch of this dairy along with several others and material improvement may soon be expected.

Inspection Service.

The following is the list of inspected live stock admitted to the Territory through the port of Honolulu:

- Oct. 1—S. S. Wilhelmina, San Francisco:
 - 1 dog, Mrs. E. D. Tenney, quarantined.
 - 5 cts. poultry.
- Oct. 1—S. S. Workman, Liverpool, England—
 - 3 bull dogs, Mr. J. W. Waldron. As they were accompanied by the proper certificates, and as England is one of the three countries regarded by us as free from rabies, they were allowed to enter the Territory without being subjected to a period of quarantine.
- Oct. 9—S. S. Honolulan, San Francisco—
 - 15 Hereford bulls, 1 Berkshire boar, Raymond Ranch.
 - 2 Jersey bulls, 1 Jersey heifer, 3 German sheep dogs (quarantined), D. P. R. Isenberg.
 - 1 Berkshire boar, W. F. X. Co.
 - 5 crates poultry.
- Oct. 10—S. S. Zealandia, Vancouver, B. C.—
 - 1 dog (Pointer), Mr. J. B. Mercer, quarantined.
- Oct. 14—S. S. Sierra, San Francisco, Cal—
 - 3 ponies, 1 monkey, Leon Morris. The three ponies were show animals, and to facilitate their handling the Board allowed them to be quarantined at the Liberty Theatre.
- Oct. 15—S. S. Hilonian, Seattle, Wash.—
 - 2 horses, Honolulu Const. and Draying Co.
- Oct. 15—S. S. China, Orient—
 - 1 crate Japanese game chickens, Diamond K.

- Oct. 16—S. S. Virginian, Tacoma, Wash.—
73 horses, Charles Bellina.
Oct. 28—S. S. Sonoma, San Francisco, Cal.—
3 crates chickens, W. F. X. Co.
Oct. 29—S. S. Chiyo Maru, Orient—
3 crates chickens, Diamond F.
Oct. 30—S. S. Wilhelmina, San Francisco, Cal.—
7 crates poultry.

Respectfully submitted,

LEONARD N CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, October 31, 1912.

Hon. Board of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of October, as follows:

During the month there arrived 35 vessels, of which 18 carried vegetable matter and 1 vessel carried clean moulding sand. The usual careful inspection was made with the following results:

<i>Disposal, with principal causes.</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests.....	1184	28,470
Fumigated	46	149
Burned	16	861
Total inspected	1246	29,480

Rice Shipments.

During the month 21,544 bags of rice arrived from Japan, most of which consisted of new crop rice. All shipments were carefully inspected and released as free from pests.

Pests Intercepted.

During the month 48 packages of fruit and vegetables, including 2 packages of sugar cane, were taken from the baggage of the passengers and destroyed. The sugar cane consisted of ten pieces, 3 feet long. This was taken to the Lucas Mill and burned.

In the mail during the month we handled 92 packages of plants and seed. We found several packages of corn and peas infested with the *Augoumois grain moth* and the *pea weevil* and notified the shippers of these infested shipments.

Several passengers from Japan brought chestnuts which we found badly infested with weevils and larvae of a moth and these were first fumigated with carbon bisulphide and then destroyed by burning. While inspecting on the dock we found a single specimen of the Harlequin cabbage bug, *Murgantia histrionica*, crawling on merchandise cargo. I only mention this to show that it is very easy for insects to be transported from one country to another. This bug probably found its way from some cabbages on an adjacent dock in San Francisco and was brought in here unmolested in the ship's hold. Also, while walking on deck of the steamer "China" from the Orient, a common Dermested beetle, *Dermestes vulpinus*, flew onto my coat, from out of the hold of the vessel. This insect infests hides and is found around bone fertilizers, etc., and is cosmopolitan.

One hundred gardenia plants which arrived by freight on the steamer "Chiyo Maru," were badly infested by a *Lepsipterus* borer, probably a *Tortrix* species. The larvae had girdled the young plants at the surface of the ground and also had made channels through the bark of the plants. Our preliminary fumigation with *Hydrocyanic* acid gas failed to kill them. We then fumigated them with *Carbon bisulphide* and burned up the entire shipment.

Hilo Inspection.

Brother M. Newell reports the arrival of 10 vessels—five steamers and five sailing vessels. The five steamers brought vegetable matter consisting of 154 lots and 2369 parcels. One package of plants was fumigated and fifty sacks of potatoes were overhauled before being released.

Inter-Island Inspection.

During the month of October 60 steamers were attended to and the following shipments were passed:

Plants	60 packages
Fruits	14 "
Lily Root	4 "
Taro	716 bags

Total 794 packages
inspected and passed.

The following packages were refused shipment:

Various fruits	40 packages
Plants infested and having too much soil	22 "
Vegetables	4 "

Total inspected and refused shipment.. 66 packages

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

REPORT OF FOREST NURSERYMAN.

Honolulu, Oct. 31, 1912.

Hon. W. M. Giffard, President and Executive Officer, Board of
Agriculture and Forestry.

Dear Sir:—I herewith submit a report of the principal work
done during the month of October, 1912.

Nursery—Distribution of Plants.

	In seed boxes	In boxes transplanted	Pot grown	Total
Sold	500	50	406	956
Gratis . . . . .	...	..	467	467
	<hr/> 500	<hr/> 50	<hr/> 873	<hr/> 1423

Collections on Account of Plants Sold.

The collections for the month on account of plants sold
amounted to \$10.05.

Arrangements are being made for the distribution of a large
number of forest and flowering trees consisting of sixteen species
for Arbor Day planting, November 8. Superintendent Pope of
the Department of Public Instruction has sent copies of a circular
letter to the principals of all the public schools of the Territory
notifying them that trees for Arbor Day planting can be had free
by applying at the Government Nursery in Honolulu and also
at the two sub-nurseries on the other islands.

Advertisements notifying the general public of the offer of this
Board to supply free trees for planting on that day are being
published in all the leading newspapers in Honolulu and on the
other islands, in the English, Hawaiian, Portuguese, Japanese and
Chinese languages.

Plantation Companies and Other Corporations.

Under this head orders have been received for 5000 trees in
transplant boxes ready to set out. Orders so far received to be
delivered during the months from November, 1912, to February,
1913, reaches the total of 500,000 assorted trees in seed boxes and
17,000 in transplant boxes ready to set out. One hundred and
forty thousand trees in seed boxes have been delivered during
the month and 12,000 trees in transplant boxes and 60,000 in seed
boxes will be delivered in November. The orders will all be filled
in time for the season's planting.

Experiment Garden, Makiki.

The men at this station have been assisting in getting trees ready for Arbor Day and doing other routine work.

U. S. Experimental Planting, Nuuanu Valley.

The man employed for the purpose of attending to the trees has been hoeing and clearing away the grass from the young trees.

Now that the weather is getting more favorable for tree planting, we intend, after the Arbor Day rush is over, to plant more species and also to fill a few blanks in the planted part of this section.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

REPORT ON ARBOR DAY.

Honolulu, Nov. 11, 1912.

Hon. W. M. Giffard, President and Executive Officer, and Board of Agriculture and Forestry, Honolulu.

Gentlemen:—Herewith I submit a special report on Arbor Day for the year 1912.

Distribution of Trees.

The total number of trees distributed for Arbor Day planting amounted to 13,645 (13,145 pot grown and 500 in transplant boxes), divided as follows:

Public Schools.

Island	Number of schools	Number of trees
Oahu	13	383
Hawaii	7	236
Maui	14	479
Kauai	6	471
Molokai	4	339
Total	44	1908

General Public.

Applications for trees were received from 248 persons residing in and around Honolulu. To this number might be added 400

children from the public schools who called on Arbor Day and received one tree each.

The number of trees distributed amounted to 9,514. From the outside districts of the other islands, including Oahu, orders were received for 2,223 trees.

Summary.

	Trees
Public Schools	1,908
In and around Honolulu.....	9,514
Outside districts of other islands including Oahu.....	2,223
	<hr/>
Total	13,645

The total number of trees distributed for Arbor Day, 1911, amounted to 11,508, making an increase of over 2000 trees for 1912.

The demand for flowering and shade trees has been much larger this year than for any preceding Arbor Day and our stock of those is almost exhausted. We have, however, a large number of forest and windbreak trees still in stock.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

ARTIFICIAL CROSS-FERTILIZATION OF THE MANGO.

By A. J. BROOKS,

Assistant Agricultural Superintendent, St. Lucia.

(From the West Indian Bulletin.)

This work, as carried on at Dominica, is at present in its initial stages, but some benefit might be derived by placing on record the work that has so far been accomplished in the attempt to raise improved varieties of mangoes from seed.

There are numerous seedling mango trees to be found in most of the West Indian islands, the fruit of many being quite valueless from a commercial point of view, whilst others possess certain meritorious qualities which allow them to be described as second or third class fruits. Of first class fruits grown directly from seed few only are known to exist, and these have usually originated from plantations which have been confined in a great measure to one variety.

This variation, or failing to breed true, in seedling mangoes is due to indiscriminate cross-fertilization such as obtains in locali-

ties where numbers of different varieties are grown in close proximity, and where no attempt is made to protect the flowers from promiscuous cross-fertilization.

It is now generally acknowledged that by securing fertilization of a plant of one variety with pollen from a plant of a different variety, through cross-pollination, we obtain a variable race of which the individual plants may be expected to possess the inseparable characters of both parents in a varying degree.

The aim of this cross-fertilization was to combine the good qualities of two distinct varieties into a single variety, by securing a number of cross-fecundations between the two, and rearing plants from the seeds thus formed.

The first step in this direction was to make oneself intimately acquainted with the structure and functions of the flower. The flower of the mango, which is pale-yellow with a pinkish tinge, is very small, being only about 3 mm. in diameter. The flowers are borne on much-branched panicles and are very brittle; therefore great care and skill are necessary in their successful manipulation. There are five stamens, not all of which are fully developed and produce pollen.

In the variety chosen as the pollen parent in this instance, two of the five stamens produced pollen but only the pollen from the largest stamen proved to be fertile.

Ceylon No. 1—the variety chosen as the pollen parent—is of good appearance, a prolific bearer, and possesses excellent keeping qualities which should make it a valuable variety for shipping purposes, but it is of poor flavor. The variety chosen as the seed parent was the Julie. This variety is a free and regular bearer and possesses an excellent flavor—by some considered to be unsurpassed—but the fruit is too delicate to stand shipment.

In this particular case the main object sought was to endeavor to procure a variety bearing the keeping qualities of the pollen parent, combined with the excellent flavor of the seed parent.

Panicles bearing flowers of the pollen parent were enclosed in muslin bags. Before the flowers had time to open, to prevent foreign pollen becoming mixed with it, panicles of the seed parent were carefully selected in the most sheltered portions of the trees, and the number of flower buds on them reduced to about twenty. As soon as these were large enough to handle—this was usually found to be about one day previous to their opening naturally—they were opened and emasculated. In most cases the corolla was also cut away with a sharp pair of curved manicure scissors; this was found to give easier access to the stigma. Great skill and care were necessary in this operation, as the pedicels are extremely brittle and many flowers were lost in this way, some falling at once and others withering, no doubt because of injuries received during emasculation.

After emasculation, the panicles were at once enclosed in soft paper bags—1 lb. sugar bags being used for the purpose—the

mouths of which were previously dipped in water to allow them to be drawn tightly round the base of the panicles and tied tightly with raffia to prevent the ingress of insects.

The stigma became receptive very shortly after the natural opening of the flower. This receptive condition of the stigma was indicated by its turning slightly darker than the style and appearing roughened on its surface; this can only be seen with the assistance of a strong lens.

A few ripe anthers were then chosen from Ceylon No. 1 and gently crushed on a watch glass. The pollen was then transferred to the stigma by a small scalpel made by hammering out the small end of a pin. This method was chosen in preference to the use of a camel-hair brush, as the amount of pollen obtainable in the case of the mango is very small and would possibly be lost in the hairs of the brush.

When the stigma had been successfully covered with the pollen the paper bags were quickly replaced. These were allowed to remain for several days, until the ovary commenced to swell; they were then removed and replaced by fine muslin bags. In all 145 flowers were operated upon as described. This extended over a period of two months.

On the ninth day from emasculation, the bags were removed in each case and the flowers examined. It was then found that the majority of them had been shed and only a total of twenty-four out of the 145 commenced to swell.

The swelling of the ovary is, I believe, commonly regarded as a sign that successful fertilization has taken place. In the present case, however, thirteen of these ovaries ceased to develop and finally withered after having doubled their normal size. This swelling was probably due to some irritation being caused by the growth of the pollen tubes.

Eleven fruits continued to develop, but unfortunately very strong winds set in and destroyed seven of the most promising when they were about half developed. With great care four fully developed fruits were obtained but only two were successfully germinated.

Complications due to polyembryony had been anticipated, but only a single seedling developed in each case.

Experiments are in progress, the results of which are hoped to further our knowledge in solving this problem of the polyembryony of the mango. In the absence of information to the contrary, it would have been assumed—had it been necessary—that the strongest of the seedlings was the “normal,” believing it to have been the result of the fertilization of the egg-cell.

The two plants obtained have been planted out and are making good growth. When they have developed sufficiently, steps will be taken to induce early fruiting so that this work can be carried on to its final issue.

COTTON-GROWING IN ARGENTINA.

The information below is part of a report by H. M. Consul at Buenos Aires, reproduced in *The Board of Trade Journal* of September 5:

Cotton-growing in Argentina cannot be said to have emerged from its initial stage of development, but indications are not lacking of a possible flourishing and profitable industry in the future. Unfortunately Argentina does not possess the population needed for the development of her latent resources and is dependent upon immigration. The lack of labor is undoubtedly the most serious obstacle to the expansion of cotton-growing in the Republic. The only available local labor is supplied by a few native Indians and peasants from Paraguay and the Province of Corrientes. Apart from this difficulty cotton would seem to offer extensive possibilities, the vast districts of the Argentine lying to the north of the 32nd degree of south latitude being admirably adapted to its growth. The climate is particularly favorable to the cotton plant, the absence of rain at the critical ripening period conducing to the production of fibre of almost unrivalled quality. The greatest advantage of all is beyond doubt the total absence in Argentina of the much dreaded boll weevil, to the ravages of which is attributed the loss of a large part of the cotton yield of 1911 in the Mississippi valley alone. While this scourge is spreading throughout the entire cotton belt of the United States, causing millions of dollars of damage, the only parasite in Argentina detrimental to the cotton plant is a cotton worm that is easily exterminated by the use of Paris green.

The area under cultivation in the United States amounts to 30,000,000 acres and the same extent of territory is available for cotton-growing in Argentina. A Spanish syndicate in Barcelona has sent a commission of experts to Argentina to study the industry, more particularly from a labor standpoint, a fact that tends to show how seriously the problem is being grappled with, particularly when taken in conjunction with the large Spanish immigration into that country, amounting to 102,277 in 1911.

The future success of the industry would, of course, lie in cultivation for export, and the aim of the Barcelona syndicate would be to draw supplies of raw cotton from Argentina instead of the United States. At present cotton is being grown on a scale that falls a long way short of even satisfying the modest demands of the home market.

Out of about 6,200 acres at present under cultivation some 4,700 acres fall to the share of the Chaco territory. An expert comparison of the rich alluvial soil of this territory with that of the Mississippi valley leaves no room for doubting its productiveness. The principal centres of the cotton-growing are in the colonies of Resistencia, Benitez Margarita, B

Pastoril, Zapallar and General Vedia. A government experimental station has also been started in the Chaco territory to supply seed which will be distributed, on application, by the Ministry of Agriculture; the industry is at present exempt from taxation.

The Government have started agricultural colonies in the Chaco territory. These colonies may be occupied by settlers, who have a right to apply for a grant of land on payment of 2½ dollars per hectare (about 1s. 9d. per acre). This concession is offered to settlers who comply with the law. Applications should be made to the Land Office, Calle Tucuman 950, Buenos Aires, but the only way to secure the land appears to be by first settling thereon and then making application for a provisional lease. This lease is only granted provided the land is entirely free from any previous lien thereon.

The Government have also allotted a large tract of land, some 2,500,000 acres in extent, to be divided up into lots of 5,000 acres and sold by auction in Buenos Aires to the highest bidder. The price of the land is payable in half-yearly instalments according to the decree at present in force.

This region will be traversed by a railway under construction from Barranqueras in the Chaco territory to Metan in Salta. As soon as the railhead reaches the 127th mile connection will be made with a branch line of the National Central Railway, thus establishing communication between the Northern provinces and the deep waterway of the Parana river, which will have a stimulating effect upon the industries of the district to be opened up.

The date of the sale by auction of the lands above referred to will be fixed as soon as the surveys of the new railway are complete, and will be announced at least three months before the sale takes place. The surveys will probably occupy a period of from three to six months.—*The Agricultural News*.

PROBLEMS OF ECONOMIC IMPORTANCE REGARDING PLANT DISEASES.

(*From the Agricultural News.*)

In his presidential address* to the British Mycological Society delivered in 1911, Professor Salmon states and illustrates, among others, four practical problems connected with certain aspects of the life-histories of economic fungi. Although these problems were all considered and illustrated with reference to economic mycology in England, yet in themselves they are equally important in connection with plant pathology in the tropics. Stated shortly they are as follows:

* Transactions of the British Mycological Society, 1911.

"What is the economic importance of that specialization of parasitism now proved to exist in many fungi?"

"What degree of importance, from the economic point of view, is to be attributed to the *saprophytic* stage in the life-history of any fungus causing a plant disease?"

"What are the conditions under which some saprophytic species of fungi become parasites?"

"What are the conditions under which a parasitic fungus attacks a new host species?"

Some few words of explanation are necessary to elucidate the subject involved in the first problem. It has been shown by inoculations, notably among members of the rust family (*Uredineae*) and of the family of powdery mildews (*Erysiphaceae*), that of a fungus species occurring on a large number of host species one form on a host species *a* cannot attack a host species *b*, and vice versa. Thus although the two forms of fungus cannot be distinguished from one another by their morphological characters, that is by those characters that together may be said to make up their general appearance, yet biologically they are different in that their powers of parasitism are very strictly limited. The economic aspect of this is that if the host species *a* and *b* are growing together and only the biological form of fungus parasitic on *a* is present, then the species *b* will appear immune. But if the fungus strain parasitic on *b* is also present or is introduced, *b* also will be attacked or its immunity will appear to break down. There is, moreover, another means whereby *b* might become attacked from *a*. It has been found in some cases that the fungus parasitic on *a* can attack a third species *x* and that when it has grown on *x* for one or more generations, spores from *x* can infect *b*. Thus *x* serves as a bridging species to carry the fungus from *a* to *b*, and the introduction of *x* into a cultivation where *a* is attacked and *b* is immune would naturally result in the breaking down of *b*'s immunity. Finally, it has also been shown that the immunity of the species *b* to the fungus strain on *a* may be partly broken down, if the parts of *b* liable to attack are damaged by adverse conditions, wounds, or the depredations of insects.

Very little, if anything, is known of the existence of biological species in the tropics; yet the matter is clearly worthy of attention, particularly in relation to the production or introduction of immune varieties of host plants and in considering legislation restricting the introduction of plants from one country into another. These applications are so evident that they do not call for further elaboration here. In conclusion it may be added that the related genera *Colletotrichum* and *Gloeosporium*, to mention only two, might well repay investigation from this point of view.

The next point raised by Professor Salmon is that of the degree of importance, from the economic point of view, of the saprophytic stage of a fungus causing a plant disease. It has been found that the mycelium producing conidial fructifications

of a fungus may live as a parasite, while that producing the ascigerous fruit lives as a saprophyte on dead and often fallen portions of the same plant. In countries with a very marked change of climate in summer and winter this power may be of considerable economic value, since the saprophytic stage may serve to carry the fungus through the winter and give rise to new outbreaks of disease in the succeeding spring. In mild winters the parasitic stage may persist, but under extreme conditions the saprophytic form may alone be able to survive. An investigation of this problem is of more importance in temperate countries than in the more uniform climatic conditions of the tropics, yet even there it should hardly be entirely neglected. It is possible, for example, that definite knowledge of the part played in spreading infection by the ascospores of *Rosellinia bunodes*, the black root disease fungus, would be of value. The perithecia in this instance always develop on a saprophytic mycelium, some time after the tree is dead. Their growth is slow and the spores have a thick outer coat—all facts which point to this stage as intended to carry the fungus through unfavorable conditions. It would appear, however, that most fungi perpetuate themselves in the tropics largely by means of conidia, since the ascigerous stage is often either entirely absent or only rarely formed.

The question of the conditions under which some saprophytic species of fungi become parasites is one of very great importance in the tropics, and one on which some information, of a rather preliminary nature, has been obtained. Quite a large number of the more serious diseases of crops are caused by fungi that are far more usually saprophytic than parasitic in habit. As an example may be taken the ubiquitous *Thyridaria tarda* found as a saprophyte on an immense number of different plants, and as a wound parasite on cacao, Hevea and tea, among other hosts. Its parasitism is largely dependent on conditions unfavorable to the growth of the host, as well as on other factors. Again, the root disease of Para rubber in the East is due to a fungus (*Fomes semitostus*) usually saprophytic on forest stumps. Its parasitism depends on the presence of large quantities of decaying wood which afford it food for vigorous vegetative development before it begins its attack, and on the presence of an ample supply of moisture. The same is probably true to some extent of *Rosellinia bunodes* referred to above. The solution of the problem in connection with many species of the family of bracket fungi (Polyporaceae), to which *Fomes semitostus* belongs, is a matter of some importance in the tropics, as many of them appear to act occasionally as wound parasites or as root parasites on trees planted in newly cleared forest land. Similar investigations would be valuable in the case of many of the toadstools (Agaricaceae) and of the genera *Colletotrichum* and *Gloeosporium*, of which many forms are found on ripe or fallen fruits.

Of the last of Professor Salmon's questions, namely, **what are**

the conditions under which a parasitic fungus attacks a new host species, nothing appears to be known in the tropics, since the records as a rule do not go back far enough to show that when a parasitic fungus is found on an apparently new host plant, it has never actually occurred on that host before in the same locality, or in some other. This again is a problem worthy of attention.

Other problems of some economic importance also occur in connection with the life-histories of fungi, besides those mentioned by Professor Salmon. One is: to what extent a strain of a parasitic fungus may lose its virulence when growing for some time on the same host plant in a limited area, exhibiting fairly uniform conditions of climate. Another is: to what extent do strains showing very marked differences in virulence occur in one species of parasitic fungus. While yet another is: to what extent do certain species of partly parasitic fungi, such as *Thyridaria tarda*, found throughout the tropics on several host plants and originally probably pure saprophytes, exhibit before our eyes a process of developing parasitism, becoming at the same time specialized to the host plant predominating in any given locality. So many partly parasitic fungi are of universal distribution in the tropics, and are capable of attacking several host plants, that it seems very possible that some of them may actually afford instances of the progress and specialization of parasitism.

The investigation of problems of the nature of those just considered belongs in a sense to the realm of pure research, and requires more time than is usually available to the plant pathologist engaged in pioneer or routine work. In fact such investigation bears much the same relation to routine plant pathology that medical research does to the work of a general practitioner. The future may prove that the parallel can be carried farther, and that the solution of these problems is as important to the economic welfare of an agricultural community as the results of medical research are to its bodily health.

A SUGAR-CANE PEST IN ST. CROIX.

Dr. Longfield Smith, Ph. D., Director of Agriculture, St. Croix, Danish West Indies, in correspondence with the Imperial Commissioner of Agriculture, has given a brief account of an insect which occurs in that island as a pest of sugar-cane.

The insect is a large, brown beetle, the name of which Dr. Smith gives as *Strategus titanus*; it belongs to the same family as the common hardback (*Ligyris tumulosus*). The larva of *Strategus titanus* is in shape and general appearance similar to the typical larvae of insects in this group, but it is much larger than the common hardback larva, attaining a length of over 2 inches, while it is about one-half inch in thickness.

The insects of this group, Dynastides, are more often scavengers, feeding on decaying organic matter, than actual pests feeding

on the living tissues of plants of economic importance. When, however, they do occur as pests the injury to plants is usually the result of the feeding of the grubs on the fine roots after the manner of the related insects of the Melolonthid group, of which the brown hardback (*Phytalus smithi*) and the May beetles (*Lachnosterna patens* in St. Vincent and *L. patruelis* in St. Kitts) are examples. In the case of the sugar-cane beetle (*Ligyris rugiceps*) of the United States, however, the injury is reported to be due to the adults tunnelling into the base of the stem. The injury to canes in St. Croix by *Strategus titanus* is different from both these. The habits of this insect are stated by Dr. Smith to be as follows: "It occurs very abundantly, much to our disadvantage. It (the larva) eats the roots of canes, sweet potatoes and other plants and burrows into the bases of the cane shoots, eating its way upward, and turning the cane into a hollow tube. The insect is saprophytic as well as parasitic. I have found it living in decaying megass heaps. At present (September 18) the grubs do not seem to be so abundant as they were, probably because many have turned to beetles, which are now busy laying eggs."

There would seem to be no doubt that *Strategus titanus* is capable of becoming a very serious pest, and it is obvious that every effort should be made to prevent the introduction of this insect into any colony where it does not at present exist.—*The Agricultural News*.

ROBUSTA COFFEE.

Testimony seems to be abundant that *Coffea Robusta* is a money producer that should receive a larger attention in Mindanao. It is a rapid, thrifty grower, an early producer, doing best under rich, alluvial, well-drained soils, thrives from sea-level up to 3000 feet altitude and does best with shade when young. Planted at corners of 12-foot squares with an additional plant in the centre, the yields, in the second year from planting, are 150 pounds of coffee per acre, and increasing annually to 2100 to 2400 pounds per acre at six years.

The tree is much freer from diseases and pests than other varieties of coffee, the fruit shells easily and is borne in thick bunches giving facility in gathering. No expensive machinery is required in the treatment of the berry. The quality is that of medium Arabian and sells at about 10% below good Java; but the ease of production more than offsets the difference in market value.

Coffea Robusta should make a good intercrop with cocoanuts and rubber. It should be planted not nearer than seven feet from rubber and a greater distance from cocoanuts.

When planted with rubber the latter would shade the coffee out in about 5 years but in the meantime the coffee pays a good dividend while the rubber is maturing. With cocoanuts planted 30 by 30 feet the intercrop coffee should continue yielding much

longer, particularly if planted six feet apart in rows running East and West so as to secure a maximum of light.

The evenly distributed rainfall, favorable to rubber and coconuts, suits the Robusta coffee the best.

This variety has made most excellent growth and yield in Basilan and would no doubt do well all over Mindanao where droughts are not pronounced and where volcanic soil rich in vegetable matter prevails.—*Mindanao (P. I.) Herald*.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

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All communications in regard to seed or trees should be addressed to David Haughe, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOEBEL,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.**

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER *and* AGRICULTURIST

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With agriculture in the broad as the mainstay of Hawaii, it is strange that the legislature is always disposed to trim the appropriations for the agricultural service to the bone.

One infected animal out of thirty-two head of dairy cattle tested for tuberculosis in November speaks eloquently for the campaign of the past three years to cleanse the dairy herds of Oahu. In all probability, the coming year will see the campaign extended to the other islands.

Surely, with the millions invested in live stock in this Territory, the legislature ought to be able to find the salaries for veterinarians in all stock-raising districts. At present the assistant territorial veterinarians employed are paid in part by planters and ranchmen, who already pay their share of general taxes for the upkeep of all public services.

At the last meeting of the board of agriculture and forestry, the projects of erecting animal quarantine stations at Hilo and Kahului were reported as making satisfactory progress. The plans for the Hilo station are in hand and the lease of the Kahului station site will soon be executed. With Hawaii and Maui thus provided for, Kauai will next be in order to equip for direct live stock importing.

With the earnest coöperation of the sugar planters' association, the board of agriculture and forestry will make special efforts the coming year in protecting the forests and sources of water. At its meeting this month, in response to a resolution of the planters' association communicated to it, the board appointed President W. M. Giffard, Albert Waterhouse and H. M. von Holt as a committee to coöperate with a committee of the planters in this work. The planters' committee consists of Albert Horner, E. D. Tenney and E. Faxon Bishop.

Two things of great importance are shown in the report of the assistant territorial veterinarian on importations of live stock in November. One is the progress being made in the improvement of beef and dairy stock, indicated by the introduction of

thoroughbred bulls by several breeders and dairymen. The other inference from the report is not so gratifying, in that it shows the importing of animals and fowls in large numbers which might all be raised in the islands.

An interesting article appears in this issue, by O. W. Barrett, chief of the Philippine division of horticulture, on needed name standards. Wrong names are among the most curious things in philology, and it is harder to stifle the popular usage of one of them than to kill a cat. It is more difficult to get "coconut," for instance, into a newspaper proofreader's "cocoanut" than Dr. Johnson said it was to drive a joke into a Scotchman's cranium.

In its first year the Forester gave considerable advocacy of co-operation on the part of small farmers in Hawaii, with special reference to establishing standards of packing fruits, etc., and to the advantageous marketing of products. In this issue will be found an interesting article on coöperation in agriculture, with special reference to India. It will be noticed that, while state aid to such coöperation is held by the writer of the article to be desirable to some extent, a completely self-reliant movement is regarded as the ideal—government assistance being considered by him as only a means to an end which "can never be a substitute for popular inspiration and direction."

At the recent meeting of the Hawaiian Sugar Planters' Association, contradiction was given to an imputation of undue secrecy regarding the operations of the association's experiment station. Refuting evidence was in part that of the issuance of bulletins of results of experiments. Interesting corroboration of this is found in four late numbers of the Agricultural News, organ of the Imperial department of agriculture for the West Indies. Bulletins of the station mentioned are quoted—one on the relation between the crushing of cane and the volume of the fibre, another (the annual report) on the hibiscus in Hawaii with reference to the hibiscus exhibition here, a third on manganese in Hawaiian soils, a fourth on the influence of molasses on nitrification in cane soils and a fifth on the fuel value of megass. Evidently the Hawaiian sugar planters are doing their full share in making Hawaii known abroad.

It makes the imagination shudder to picture the condition that might exist in Hawaii if there were no division of entomology, with strict inspection of imported plants, to ward off invasions of pests. When the many pests intercepted each month by this division are considered, it may fairly well be concluded that the absence of protective measures would simply mean that agriculture and horticulture would be impossible in these islands. There is also to be remembered the invaluable work done, both

by the government entomologists and those employed by the sugar planters, in exterminating or controlling such enemies of vegetation as have gained an entrance to the group. This eternal vigilance and this interminable warfare mean untold millions to the wealth of Hawaii. Like remarks would fit the work of the division of animal industry in combating and repelling the maladies of live stock, several known ones among them being menaces also to human life. If it were not for the unceasing vigilance and exertion of those directing this division, it would be a matter of but a short time when there would not be a head of live stock in the islands worth a week's purchase.

COLLEGE OF HAWAII AS PROMOTION ASSET.

In a former number of the Forester comment was made on the advocacy by Tropical Life (London) of agricultural colleges in the tropics, with the suggestion that the College of Hawaii, eventually, might be in a position to bid for students from distant parts for training in specialized tropical agriculture. Students of this institution would have an advantage over similar colleges elsewhere, from being in touch with the highly developed experiment station of the sugar planters here. H. Hamel Smith, editor of Tropical Life, in a letter to the Westminster Gazette, urges the need of agricultural colleges in the tropics for the benefit of Englishmen desirous of entering a career of tropical agriculture. In the following remarks, extracted from his letter, there is the germ of a big idea in Hawaiian promotion for development with regard to the College of Hawaii:

"The very fact that one or more agricultural colleges have been established in the tropics would attract the attention of an energetic, ambitious, and extremely useful class of capitalist to those centers as channels for investment and trade. These at present hold aloof because they see no reliable means of training themselves for such a life. With many fathers of families having sons to place out in the world, or younger men with capital, once they can see their way clear to obtain a good return on the labor and money they are willing to expend on one or other of the tropical agricultural industries, a very large number, with only a few thousands to invest, would be willing to pay for their training first at an agricultural college on this side on general principles, and then at the college in the tropics to specialize."

DIVISION OF ANIMAL INDUSTRY.

GLANDERS IN WAIPIO VALLEY.

Honolulu, Dec. 11, 1912.

Mr. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry, Honolulu, T. H.

Sir:—In compliance with instructions received I returned to Waipio Valley on November 13th.

As outlined in my last report it was to be feared that many, if not all, of the horse stock belonging to the Chinese rice planter Akaka was suffering from or at least had become affected with glanders from the seven clinical cases which I had destroyed on my previous visit.

The quarantine of the Valley has been continued, no horse stock from there being allowed to pass the Hamakua gate leading to Waimea and only the pack animals belonging to the taro planters, all of which had been found to be sound, had been allowed to carry paiai as far as Paauhau and to return immediately.

The first step upon my return was therefore to reinspect these animals, 41 in all, which was done at the mouth of the Valley at the top of the trail. When the animals fully loaded have climbed this steep trail, a continuous effort requiring about three-fourths of an hour, they are sure to show symptoms, especially a discharge from the nose, which otherwise might remain concealed; but, as stated, they were all found to be sound.

As far as Akaka was concerned there remained quarantined at his place twenty-eight horses and one mule colt. One animal had died since my previous visit and three showed physical symptoms of the disease not visible when they were first examined. It was decided to submit all of these animals to the intradermal mallein test, a method which originated with this division. I first injected the saddle horses which my assistant and myself were riding, animals known to be absolutely sound, after which with the same syringe and with mallein out of the same bottle the twenty-eight animals belonging to Akaka were injected. This was no easy matter, as the operation is very delicate, requiring the use of an extremely fine hypodermic needle, and several of the animals had to be thrown down in order to secure them sufficiently to allow of the needle being inserted into the hide without penetrating it. On this point the success of the operation depends. If the needle penetrates the hide no reaction is obtained no matter how severely the animal might be affected. Only two drops is injected, generally on the side or the neck, the place of operation having first been disinfected.

The test proved an absolute success. Within one hour from the time of injection the minute swelling, originally the size of a